

AN
ACCOUNT
OF THE
TRIGONOMETRICAL SURVEY

CARRIED ON IN THE
YEARS 1795, AND 1796,

BY ORDER OF THE RIGHT HONOURABLE THE
MARQUIS CORNWALLIS,

MASTER GENERAL OF THE ORDNANCE.

BY
COLONEL EDWARD WILLIAMS,

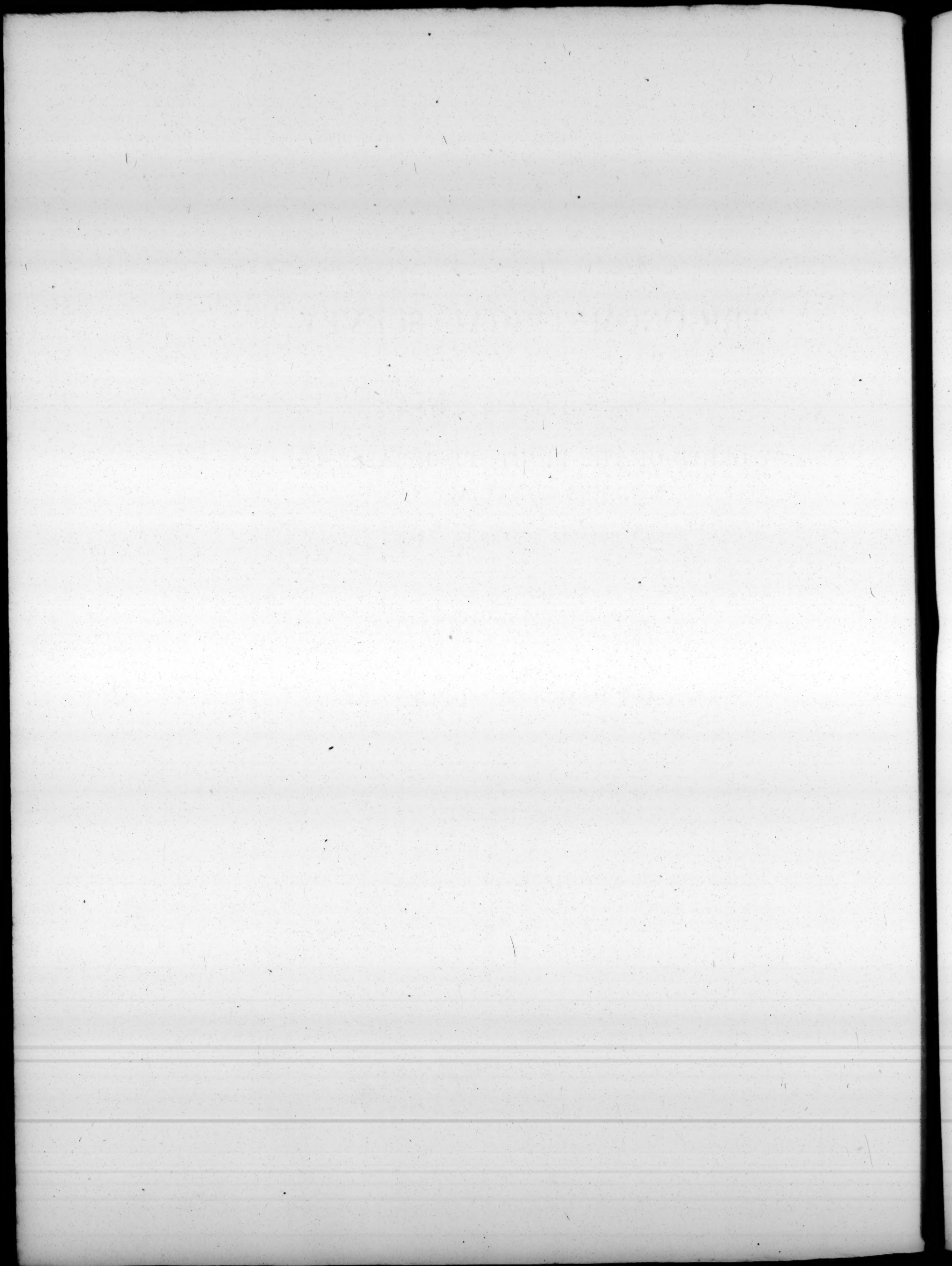
AND
CAPT. WILLIAM MUDGE,

OF THE ROYAL ARTILLERY;

AND
MR. ISAAC DALBY.

COMMUNICATED BY THE DUKE OF RICHMOND, F. R. S.

FROM THE
PHILOSOPHICAL TRANSACTIONS.



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AN
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Read before the ROYAL SOCIETY, May 11, 1797.

PART FIRST.

PREAMBLE.

ACCORDING to the resolution expressed in the account of the Trigonometrical Survey, printed in the Philosophical Transactions for the year 1795, we now communicate to the public, through the same channel, a farther relation of its progress.

On referring to the above paper, it will be found that, for the prosecution of this undertaking, a design was formed of proceeding to the westward, with a series of triangles, for the survey of the coast. This intention has been carried into effect; and as the small theodolite, or circular instrument, announced in our former communication as then in the hands of Mr. RAMSDEN, was finished early in the summer of 1795,

we are enabled to give a series of triangles, extending, in conjunction with those before given, from the Isle of Thanet, in Kent, to the Land's End.

In the composition of the following account, we have adhered to the plan adopted in the last, of giving the angles of the great triangles, with their variations; and we have, with as much brevity as possible, inserted a narrative of each year's operations. This will be found, however, to extend only to the First Part, or that containing the particulars of the survey in which the great instrument alone was used. The remaining contents of this portion of the work, are necessarily confined to the angles of the principal, and secondary triangles, with the calculations of their sides, in feet; and likewise such *data* as have no connection with the computations of latitudes and longitudes.

Part the Second contains an account of a survey carried on in Kent, in the years 1795 and 1796, with the small instrument, by order of the Master General, for completing a map of the eastern and southern parts of that county, for the use of the Board of Ordnance, and the military commanders on the coast.

In Part the First will be found an article, for which we are indebted to Dr. MASKELYNE, the Astronomer Royal. It contains his demonstration of M. DE LAMBRE's formula, in the

Connoissance des Temps of 1793, for reducing a distance on the sphere to any great circle near it, or the contrary. The *practical rule* thence derived, for reducing the angles in the plane of the horizon, to those formed by the chords, is very useful, and will considerably abridge the trouble which must necessarily arise in computing the chord corrections by any former method.

SECTION FIRST.

ARTICLE I. *Of Particulars relating to the Operations of the Year 1795.*

In an early part of this season, from the necessity which existed of completing the map of Kent, mentioned in the preamble, we had conceived that our former intentions, of continuing the survey towards the west, would for the present be relinquished; as it was not imagined that the telescope of the small circular instrument, then in the hands of Mr. RAMSDEN, could be applied, with good effect, in observing staffs erected on very distant stations.

From the obvious importance, however, of adhering to the first resolution, it was determined that a trial should be made of the excellence of this instrument, in the construction of which extraordinary pains had been taken, by operating with it in Kent, and using it for those purposes to which, if the object before spoken of had not been in view, the great theodolite would have been necessarily applied.

This smaller theodolite, therefore, as a substitute, was in May taken into Kent by Mr. DALBY, and Mr. GARDNER, chief draughtsman in the Tower; the assistance of the former being necessary, as the stations in the series of 1787 were for the most part unknown to the latter gentleman.

As the former paper, relating to the trigonometrical survey, could not be presented to the Royal Society before the 4th of June, the business did not commence till the 12th of the same month. The party then left London, and the instrument was taken to Bull Barrow, in Dorsetshire.

On a reference to the account of 1795, it will be seen, that a station was chosen near Lulworth, and observed both from Nine Barrow Down and Black Down. It was also intended to be observed from Bull Barrow; by which means the great triangle, formed by the stations Black Down, Nine Barrow Down, and Bull Barrow, would be divided into, and made to consist of, two smaller triangles. This, however, it was now found could not be done, as a signal house had been erected near the station at Lulworth, subsequent to the operations in 1794, which prevented that spot from being afterwards seen at Bull Barrow: but no consequences very injurious can have arisen from the impracticability of making use of this station in the manner originally proposed, since the stations formerly chosen in Portland, with which that of Lulworth was also intended to connect, have not been visited with the instrument. The stations in that island were selected with a view of observing from them, and Charton Common, some point in the vicinity of Torbay, which might be a proper station in the series intended to be carried along the coast. Such a situation, however, could not be conveniently found, as the view of Devonshire from Charton Common is much interrupted by trees and other obstacles; and it would have been highly improper to shorten the side between Pilsden Hill and the coast, by choosing a station more remote from the latter than Charton Common.

As from an inspection of the plan of the triangles annexed to this account, a doubt may be entertained as to the propriety of carrying on so very extensive a series from the short side connecting the stations on Black Down and Mintern Hill; it must be observed that, admitting the necessity of adopting Bull Barrow for a station, those on Pilsden and Mintern Hills were

naturally chosen; the first, because it connected with Dumpdon (a station that could not be dispensed with); and the second, because it was the point most remote from Black Down, being on the brow of the high land overlooking the general surface of Somersetshire.

To connect with the station formerly chosen near Maiden Bradley, two others were selected whilst the party were at Bull Barrow; one on Ash Beacon, near Sherborne, and the other on the Quantock Hills. Both these have very commanding views, and will hereafter easily unite with any stations which may be chosen to the northward.

From Bull Barrow, the instrument was successively taken to the following stations, before any other new ones were chosen, *vi.* Mintern, Pilsden, and Charton Common; and whilst the party were at the latter, nearly all the stations were selected in Devonshire. In the choice of these, much difficulty occurred, as the face of this county is particularly unfavourable for operations of this kind. Around Honiton and Chard, there are several small ranges of hills, nearly of an equal height, running in parallel directions. Near the former are three, thus circumstanced; *viz.* Hembury Fort, Combe Raleigh, and Dumpdon. From the first and second of these, the station on Charton Common is not visible; and it is from the last only, that both Pilsden and the Quantock Hills can be seen. This station, however, has a disadvantage: Combe Raleigh, which is to the west of it, takes off all view round Tiverton and Silferton; so that it became indispensably necessary to select a spot on the northern extremity of Dartmoor, called Cawsand Beacon.

To those who are acquainted with the interior of Dartmoor,

it will be unnecessary to assign the reason for not having chosen any station towards its centre. It may be sufficient to observe, that two spots were found on its circumference, which render the want of it trifling in its consequences.

Independent of the stations to which, as we have before observed, the instrument was taken this year, the following were visited, *viz.* Dumpdon, Little Haldon, Furland, and Butterson. From the latter, the party returned to London in the month of October.

ART. II. *Angles taken in the Year 1795.*

At Bull Barrow.

Between		°	'	"	Mean.
Mintern Hill and Black Down	-	46	54	33	} 34
				34,75	
				34	
Black Down and Nine Barrow Down		84	31	22,25	} 23,25
				24	
Nine Barrow Down and Wingreen		93	33	0,5	} 0,25
				32 59,75	

At Mintern Hill.

Bull Barrow and Black Down	-	101	39	30	} 30,5
				31,25	
Black Down and Pilsden	-	68	30	45,75	} 46,5
				47	

On Charton Common.

Little Haldon and Dumpdon	-	68	12	49,75	} 51,25
				51,25	
				52,75	
Dumpdon and Pilsden	-	93	54	36,25	} 37,25
				37,5	
				38	

Between				Mean.
Pilsden and Black Down	-	-	47 39 17,5 19,25	18,5

On Pilsden Hill.

Mintern and Black Down	-	44 37	51,5 52,5 53 54,25 55,5	53,25
Black Down and Charton Common		105 5	25,75 26 26	26
Charton Common and Dumpdon		47 32	0,25 1,25 2,5	1,25

At Dumpdon.

Charton Common and Little Haldon		86 39	7 7,25 8,5 8,75 9,25	8,25
Little Haldon and Cawsand Beacon		35 7	6,5 6,75 8,25	7,25
Pilsden and Charton Common	-	38 33	22 22,25 22,25 23 23,5 23,5	22,75

At Little Haldon.

Furland and Rippin Tor	-	-	84 58 42 43	42,5
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Trigonometrical Survey.

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Between	°	'	"	Mean.
Rippin Tor and Cawsand Beacon	29	30	9,25 11 11	} 10,5
Dumpdon and Charton Common	25	8	0,75 2	} 1,25
Dumpdon and Furland -	143	52	32,75 33 34	} 33,25

At Furland.

The Bolt Head and Butterson -	53	15	34,25 35,75	} 35
Butterson and Rippin Tor -	43	38	4 5,25	} 4,5
Rippin Tor and Little Haldon -	39	24	36,75 37,75	} 37,25

At Butterson.

Rippin Tor and Furland - -	74	21	56 56,5 57,25 58 58,5	} 57,25
Furland and the Bolt Head -	63	47	50,75 50,75	} 50,75
The Bolt Head and Kit Hill -	127	37	36,5 36,75	} 36,5
Maker Heights and Kit Hill -	42	11	38,75 38,75	} 38,75
Maker Heights and Carraton Hill	35	30	28 28,75 29,75	} 28,75

ART. III. *Of Particulars relating to the Operations of the
Year 1796.*

In the account of this Survey, published in the Philosophical Transactions for 1795, page 473, it is stated, that large stones were sunk in the ground at the extremities of the base of verification on Salisbury Plain. To render these points permanent, two iron cannon (selected from among the unserviceable ordnance in Woolwich Warren) were, towards the end of February, sent to Salisbury, and in the beginning of March inserted at the ends of the base. The same methods were adopted, for the purpose of fixing these cannon in their proper positions, as those made use of when similar *termini* were sunk in the ground on Hounslow Heath. This operation having been completed on the 10th of March, the instrument was shortly after carried to Kit Hill, in Cornwall; a station, like that on Bindown, chosen rather for the purpose of a secondary, than a principal place of observation.

It would be tedious, and perhaps unnecessary, to enumerate the names of all the stations selected this year, as many of them do not form any part of the series now given to the public. We shall, therefore, confine ourselves to such remarks on the subject as may serve to abridge this article.

We have before stated, that a station was chosen on Cawsand Beacon, the northern extremity of Dartmoor, for the purpose of connecting with Dumpdon. It should have been observed, that to the westward of the former eminence, and near it, there is a hill considerably higher, which in point of situation has many advantages, but which cannot be made

use of on account of the ruggedness of its surface, which seems to render the carrying of the instrument to its top almost impossible. From this circumstance, and similar impediments, which the high lands remote from the circumference of Dartmoor offer to our operations, it results, that the body of this moor cannot have any great triangles carried over it: such stations were therefore selected this year as may serve, in conjunction with others, to include this tract of country in a polygon of a small number of sides.

To make observations for the purpose of hereafter determining the longitude and latitude of the Lizard, was a principal object in this year's operations; and as this headland seems to offer itself as very convenient for a station, it will be right to assign our reasons for not having chosen one upon it.

As no other spot but Hensbarrow Beacon could be found in that part of Cornwall proper for a station, it became necessary to fix on the Deadman, or Dodman, for another point in the series. From this place no part of the land within four miles of the Lizard can be seen, as the high ground about Black Head, which is to the eastward of the latter, is nearly in a line between them, and is also much higher than both. It will be perceived, however, that no evil can result from the want of such a station, as the light-houses and the naval-signal-staff at the Lizard, have been intersected from several stations. The precise spot on which Mr. BRADLEY made his observations in the year 1769, for ascertaining the longitude and latitude of this headland, was pointed out by the person having the care of the light-houses, who well remembered the common particulars relating to his operations: such measurements were made from the light-houses to this spot, as may enable us, at a future

period, to compare the results from the *data* afforded by the trigonometrical operation, with those deduced from the astronomical observations made by the above gentleman. It may be also mentioned, that angles were at the same time taken at the western light-house and signal-staff, for the purpose of finding the situation of the Lizard Point.

We are now to speak of the most important business performed this year; that of making observations to determine the distance of the Scilly Isles from the Land's End.

To do this as accurately as possible, it became necessary to find stations affording the longest *base*. The hill near *Rosemergy*, called the *Watch*, and the station near St. Buryan, are certainly the most advantageous places, because all the islands can be seen from both; but we could not avail ourselves of the former, as difficulties almost insuperable would have attended an attempt to get the instrument upon it. Another station was therefore selected, on Karnminnis, near *St. Ives*; a spot as well situated as the place spoken of, provided all the islands could be seen: this, however, does not prove to be the case, *St. Martin's Day-Mark* being the only object in the Scilly Islands visible from Karnminnis.

From the stations near the Land's End (Sennen and Pertinney), as well as that above mentioned (St. Buryan), St. Agnes' Light-house, and two objects in St. Mary's, were observed; and as the means by which all their distances are determined, except those of the Day-Mark, from the shortness of the bases (which were, however, the longest that could be found) are exceptionable, it will be right to mention, that while we were engaged in that part of the operation now spoken of, the air was so unusually clear, that we could sometimes, with the

telescope of the great theodolite, discover the soldiers at exercise in St. Mary's island.

Under this article, it will be convenient to state, that we have endeavoured to find some spot to the westward, on which a base might be measured. Had we been fortunate in this respect, it undoubtedly would be eminently advantageous; as those triangles, now extended to the Land's End, would, in that case, be verified in some part of the new series. In Devonshire and Cornwall, however, no place has been discovered by any means fit for the purpose; so that our communicating this work, under the circumstances attending it, is a matter of necessity.

In the present and former seasons, such stations were selected and observed, as were judged to be proper for the future use of the small instrument; and as we had experienced, in the early stage of this Survey, much delay and disappointment from the white lights not being always seen when fired on distant stations, we have since substituted lamps and staffs in their stead. The operations of the present year were continued till October, when the party returned to London.

ART. IV. *Angles taken in the Year 1796.*

At Kit Hill.

Between		°	'	"	Mean.
Butterton and Maker Heights	-	48	36	45	} 46,5
				47,75	
Maker Heights and Bindown	-	53	21	13,75	
Carraton Hill and Bindown	-	50	45	31	

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Carraton Hill and Bindown	-	50	45	31	

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*The Account of a
On Maker Heights.*

Between				Mean.
Lansallos and Carraton Hill	-	48 39	54,75 54,75	} 54,75
Carraton and Butterton	-	112 18	7,75 9,75	} 8,75
Butterton and the Bolt Head	-	45 54	35,75 38,5	} 37
Bindown and Carraton Hill	-	28 22	50,75	
Bindown and Kit Hill	-	51 29	20,5 24,5	} 22,5
Kit Hill and Butterton	-	89 11	33,25 36	} 34,75

At the Bolt Head.

Maker Heights and Butterton	-	48 39	24,5 24,75	} 24,75
Butterton and Furland	-	62 56	36,5	

At Rippin Tor.

Cawsand Beacon and Little Haldon		124 59	12,75 13,5	} 13
Little Haldon and Furland	-	55 36	39 41,75	} 40,5
Furland and Butterton	-	61 59	59,25 59,5	} 59,5

On Cawsand Beacon.

Dumpdon and Little Haldon	-	43 14	20 22,5	} 21,25
Little Haldon and Rippin Tor	-	25 30	39,5 40,25	} 39,75

On Carraton Hill.

Between		°	'	"	Mean.
Maker Heights and Lansallos	-	67	12	20,25 23,5	} 21,75
Lansallos and Bodmin Down	-	56	21	16,75 17	} 17
Lansallos and Hensbarrow Beacon		37	28	57,75 58	} 58
Butterton and Maker Heights	-	32	11	22,5 23,5	} 23
Kit Hill and Bindown	-	91	45	22,5	
Maker Heights and Bindown	-	38	58	38,5	

On Bindown.

Lansallos and Carraton Hill	-	119	9	36,25	
Carraton Hill and Kit Hill	-	37	29	5,75	
Kit Hill and Maker Heights	-	75	9	24,5	

At Lansallos, or Polvinton Farm.

Deadman and Hensbarrow Beacon		52	34	2 2,5 5	} 3
Hensbarrow Beacon and Bodmin Down		45	1	10,75 12,75	} 11,75
Bodmin Down and Carraton Hill		54	57	43,25 44,75	} 44
Carraton Hill and Bindown	-	32	36	43,25	
Carraton Hill and Maker Heights		64	7	43,5 43,75 45,75	} 44,25

On Bodmin Down.

Carraton Hill and Lansallos	-	68	40	57,75 41 40	} 59
				0,75 58,5	

Between

Lansallos and Hensbarrow Beacon

°	'	"	Mean.
67	59	27,5	} 27,75
		28	

On Hensbarrow Beacon.

Carraton Hill and Lansallos

- 42 32 8,5

Bodmin Down and Lansallos

- 66 59 21,75 } 23,25
25

Lansallos and Deadman

- - 71 13 35 } 35,25
35,25
35,5

Deadman and St. Agnes' Beacon

77 20 28,5 } 29,5
28,75
31,5*On St. Agnes' Beacon.*

Hensbarrow Beacon and Deadman

34 31 17 } 20,25
21
23

Deadman and Karnbonellis

- 75 51 53 } 53,25
53,75

Karnbonellis and Karnminnis

- 57 46 31 } 31,25
31,5*On Karnminnis.*

St. Agnes' Beacon and Karnbonellis

32 30 0,25 } 0,25
02,5

Karnbonellis and St. Buryan

- 111 53 15,5 } 16
16,5

St. Buryan and Pertinney

- 13 48 16,75 } 18
17
20,75*At St. Buryan.*

Karnminnis and Karnbonellis

- 41 43 45,25 } 45,25
45,5
45

Trigonometrical Survey.

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Between		°	'	"	Mean.
Pertinney and Karnminnis	-	52	31	27,5 27,5	} 27,5
Sennen and Pertinney	- -	75	36	11 11,75 12	} 11,5

At Sennen.

Pertinney and St. Buryan	-	36	39	18,5 19,25	} 18,75
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On Pertinney.

Karnminnis and St. Buryan	-	113	40	15,25 16	} 15,5
St. Buryan and Sennen	- -	67	44	30,5 31,25	} 31

At Karnbonellis.

St. Buryan and Karnminnis	-	26	22	59,25 59,5	} 59,25
Karnminnis and St. Agnes' Beacon		89	43	27,25 28,75 31,25	} 29
St. Agnes' Beacon and the Deadman		78	16	39,75 40,5 43	} 41

On the Deadman, or Dodman Point.

Karnbonellis and St. Agnes' Beacon	25	51	24,5 24,75	} 24,75
St. Agnes' Beacon and Hensbarrow Beacon	68	8	12,5 13,75	} 13
Hensbarrow Beacon and Lansallos	56	12	22,5 22,75	} 22,75

ART. V. *Situations of the Stations.*

Mintern, or Revel's Hill. This station is in Dorsetshire, and situated on Revel's Hill, which is not far from Mintern. It is 17 feet N. E. from the corner of the hedge.

Pilsden. This station is also in Dorsetshire, and near Broadwindsor. The point is on the S. E. corner of the old parapet.

Charton Common. The station is in the field adjoining to, and also to the westward of, the Common, and is about two miles from Lyme: it is 50 yards from the eastern hedge, and may be easily found, as Black Down is only visible from that spot, being seen between two trees.

Dumpdon; about three miles N. E. of Honiton. The station is 10 feet northward of the hedge of the plantation, and nearly on the highest part of the hill.

Little Haldon; near Teignmouth, in Devonshire. The station is 80 yards from the *Direction Post*, and in a line with it and the Obelisk on *Great Haldon*.

Cawsand Beacon; near South Zeal. The station is about 200 feet north of the Karn, or great heap of stones.

Ripplin Tor. This station is also on Dartmoor, and about 5 miles from Ashburton. The point is mid-way between the two heaps of stones.

Furland; a field near the turnpike-gate between Brixen and Dartmouth. The station is near the stone, erected in the middle of the field.

Butterton. The station is 45 feet S. W. of the Karn, on the hill called by this name, and about 1 mile from Ivy Bridge.

The Bolt Head. The station is on the spot called *White Soar*, above the Bolt; it is 95 feet in the line produced, north-

ward, from the west side of the signal-house, and about 90 feet from the nearest corner of it.

Maker Heights. This spot is near Cawsand, and the station is 45 feet from the great flag-staff, in the line produced from Statten Battery passing by the side of the staff.

Kit Hill, near Callington. The station is on the S. W. bastion of a work, similar to an Indian fortification.

Carraton Hill. This station is about 4 miles north of Liskeard; and the point 150 yards south of the highest Karn on the top of the hill.

Bindown, near Looe. The station is 50 yards eastward of the barrow on this hill.

Lansallos. The station is in a field belonging to *Polvinton Farm*, which is near that town. The point is 159 feet from the western bank, and $90\frac{1}{2}$ from the southern one.

On Bodmin Down. The station 120 yards south of the high road, and about a quarter of a mile east of the turnpike gate. The point is in the centre of a remarkable ring.

Hensbarrow Beacon, near St. Roach. The station is on the top of the barrow.

The Deadman, or Dodman Head. The station is about 40 feet south of the bank, and nearly 100 yards to the east of the entrance into the inclosure.

St. Agnes' Beacon. The station is on the southern brow of the beacon, and about 80 yards from the tower.

Karnbonellis. The station is 90 yards south of the northern Karn, or heap of stones. The hill called *Karnbonellis* is near *Porcillis*.

Pertinney. The station is in the middle of the ring on its top. This hill is about 2 miles eastward of *St. Just*.

Sennen. This station is in the north-west corner of a field belonging to Mr. WILLIAMS. The field may be easily found, as there is no other spot near the town of *Sennen*, from which the Longship's Light-house, Pertinney, and St. Buryan, can be seen.

Karnminnis, near St. Ives. The station on the top of this hill, may be found from the following measurements :

	Feet.	In.	
The station from 3 large	8	8	from the south
moor-stones, south of	11	0	— north
the hedge.	14	1	— west

stones.

St. Buryan. The station is in a field adjoining the town, and by the side of the *Penzance* road. It is $84\frac{1}{2}$ feet from the stile, and 48 feet from a large stone in the northern hedge. This stone is 81 feet from the stile; the station, this stone, and Chapel Karnbury, being in a right line.

ART. VI. *Demonstration of M. de Lambre's Formula in the Connoissance des Temps of 1793, for reducing a Distance on the Sphere to any great Circle near it, or the contrary.* By Nevil Maskelyne, D. D. F. R. S. and Astronomer Royal.

Put A = angle subtended by two terrestrial objects; a = the same reduced to the horizon; H, b the two apparent altitudes: if either is a depression, it must be taken negative.

By spherics, $c, A = c, a \cdot c, H \cdot c, b + s, H \cdot s, b$.

Put $A = a + d a$, where $d a$ signifies $A - a$, and not their differential.

By trigonometry $c, A = c, a \cdot c, d a - s, a \cdot s, d a = c, a \times \sqrt{1 - v s}, d a - s, a \cdot s, d a = c, a - c, a \times 2 s^2, \frac{1}{2} d a - s, a \cdot s, d a$ (by theo-

$$\begin{aligned}
 \text{rem above)} &= c, a \cdot c, H \cdot c, b + s, H \cdot s, b \cdot \cdot s, da + 2s^2, \\
 \frac{1}{2} da \cdot 't, a &= 't, a - 't, a \cdot c, H \cdot c, b - s, H \cdot s, b \times \text{cosec. } a \\
 &= 't, a - 't, a \times \frac{1}{2} c, \overline{H - b} + \frac{1}{2} c, \overline{H + b} - \text{cosec. } a \\
 &\times \frac{1}{2} c, \overline{H - b} - \frac{1}{2} c, \overline{H + b} \text{ (because } 't, a = \frac{1}{2} 't, \frac{1}{2} a - \frac{1}{2} t, \frac{1}{2} a; \\
 \text{and cosec. } a &= \frac{1}{2} 't, \frac{1}{2} a + \frac{1}{2} t, \frac{1}{2} a) = \frac{1}{2} 't, \frac{1}{2} a - \frac{1}{2} t, \frac{1}{2} a \\
 &\times 1 - \frac{1}{2} c, \overline{H - b} - \frac{1}{2} c, \overline{H + b} - \frac{1}{2} 't, \frac{1}{2} a + \frac{1}{2} t, \frac{1}{2} a \\
 &\times \frac{1}{2} c, \overline{H - b} - \frac{1}{2} c, \overline{H + b} = \frac{1}{2} 't, \frac{1}{2} a \times 1 - c, \overline{H - b} \\
 &- \frac{1}{2} t, \frac{1}{2} a \times 1 - c, \overline{H + b} = \frac{1}{2} 't, \frac{1}{2} a \times vs, \overline{H - b} - \frac{1}{2} t, \frac{1}{2} a \\
 &\times vs, \overline{H + b} = 't, \frac{1}{2} a \cdot s^2, \frac{1}{2} \overline{H - b} - t, \frac{1}{2} a \cdot s^2, \frac{1}{2} \overline{H + b}.
 \end{aligned}$$

Put $n = 't, \frac{1}{2} a \cdot s^2, \frac{1}{2} (H - b) - t, \frac{1}{2} a \cdot s^2, \frac{1}{2} (H + b)$,

We shall have

$$s, da + 2s^2, \frac{1}{2} da \cdot 't, a = n;$$

$$\text{and } s, da = n - 2s^2, \frac{1}{2} da \cdot 't, a.$$

$$\text{But } s, da = 2s, \frac{1}{2} da \cdot c, \frac{1}{2} da$$

$$\therefore s, \frac{1}{2} da = \frac{s, da}{2c, \frac{1}{2} da} = \frac{n - 2s^2, \frac{1}{2} da \cdot 't, a}{2c, \frac{1}{2} da},$$

$$\text{and } s, da = n - 2s^2, \frac{1}{2} da \cdot 't, a = n - 2't, a \left(\frac{n - 2s^2, \frac{1}{2} da \cdot 't, a}{2c, \frac{1}{2} da} \right)^2,$$

$$\text{because } \left(\frac{n - 2s^2, \frac{1}{2} da \cdot 't, a}{2c, \frac{1}{2} da} \right)^2 = \frac{n - 4n \cdot s^2, \frac{1}{2} da \cdot 't, a + 4s^4, \frac{1}{2} da \cdot 't^2, a}{4 \times 1 - s^2, \frac{1}{2} da}$$

$$\begin{aligned}
 &= \frac{n^2}{4} + \frac{n^2 s^2, \frac{1}{2} da}{4} - n \cdot s^2, \frac{1}{2} da \cdot 't, a - n \cdot s^4, \frac{1}{2} da \cdot 't, a \\
 &+ s^4, \frac{1}{2} da \cdot 't^2, a) = n - \frac{1}{2} n^2 \cdot 't, a - \frac{1}{2} n^2 \cdot 't, a \cdot s^2, \frac{1}{2} da \\
 &+ 2n \cdot 't^2, a \cdot s^2, \frac{1}{2} da + 2n 't^2, a \cdot s^4, \frac{1}{2} da - 2't^3, a \cdot s^4 + \frac{1}{2} da,
 \end{aligned}$$

by substituting for $s, \frac{1}{2} da$ its near value n ,

$$= n - \frac{1}{2} n^2 't, a - \frac{n^4 't, a}{8} + \frac{1}{2} n^3 't^2, a + \frac{1}{8} n^5 't^2, a - \frac{1}{8} n^4 't^3, a,$$

where the last term but one containing the 5th power of n may be rejected, as it has been omitted by M. DE LAMBRE.

As da is always very small, the arc da in parts of the radius, unity, $= s, da$ in parts of the same radius, therefore

D

$s, 1'' : 1'' :: s, d a$ (in parts of radius unity) : $\frac{1}{s, 1''} \times s, d a = d a$ in seconds,

$$\begin{aligned} &= \frac{1''}{s, 1''} \times n - 2 s^2, \frac{1}{2} d a, 't, a = \frac{1''}{s, 1''} \times n - d a, s, \frac{1}{2} d a, 't, a = \frac{1'' \times n}{s, 1''} \\ &- \frac{1'' \times d a, s, \frac{1}{2} d a, 't, a}{s, 1''} \dots \text{if we put } n = \frac{1''}{s, 1''} \times t', \frac{1}{2} a, s, \frac{1}{2} (H - b) \\ &- t, \frac{1}{2} a, s^2, \frac{1}{2} (H + b), \text{ and } d a = a \text{ number of seconds, we} \\ &\text{shall have} \end{aligned}$$

$d a = n - d a, s, \frac{1}{2} d a, 't, a$; and, for the most part, without any sensible error, $d a = n - n, s, \frac{1}{2} n, 't, a$.

Table I. contains $\frac{1'' \times t, \frac{1}{2} a}{10000}$, and $\frac{1'' \times 't, \frac{1}{2} a}{10000}$; Table II. contains $10000 \times s^2, \frac{1}{2} (H \mp b)$. Table III. contains the term $- n, s, \frac{1}{2} n, 't, a$. The argument on the side is a , and that on the top is n or the result found by the help of the two first tables. If this correction should be considerable, with the value of $d a$, found after this correction has been applied, enter Table III. again at the top, and with a on the side as before; the number now found subtracted from n will give the correct value of $d a$.

By the investigation,

$$d a = \frac{1}{2} 't, \frac{1}{2} a, v s \overline{H \simeq b} - \frac{1}{2} t, \frac{1}{2} a, v s, \overline{H \pm b} - v s, d a, 't a,$$

where the upper or lower signs are to be used, according as the objects are on the same, or on contrary sides of the great circle to which they are referred; the third term will be negative or positive, according as a is less or more than 90° .* If $d a$ should come out negative, A will be less than a , or a greater than A . In the case of reducing a spheric angle to the angle

* Compute the two, which will give the approximate value of $d a$, and make use of them in computing the third term; and join the three terms together according to their signs, which will give $d a$ still nearer; and, if this should prove considerable, compute the third term a second time with the new value of $d a$.

between the chords, the spheric angle will be represented by a , and the angle between the chords by $A = a + da$; and $da = \frac{1}{2}t, \frac{1}{2}a \cdot vs, \overline{H \sim b} - \frac{1}{2}t, \frac{1}{2}a \cdot vs, \overline{H + b} - vs, da \cdot t, a$ (if D, d represent the arcs to the chords) $= \frac{1}{2}t, \frac{1}{2}a \cdot vs, \frac{1}{2}(D \sim d) \pm \frac{1}{2}t, \frac{1}{2}a \cdot vs, \frac{1}{2}(D + d) - vs, da \cdot t, a$;
 $A = a - (\frac{1}{2}t, \frac{1}{2}a \cdot vs, \frac{1}{2}\overline{D + d} - \frac{1}{2}t, \frac{1}{2}a \cdot vs, \frac{1}{2}D \sim d) - vs, da \cdot t, a$; where the last term will change its sign to affirmative, if a is greater than 90° . If the answer is required in seconds, the correction must be multiplied by 206265, the number of seconds in an arc = radius. The calculation will be easily made by logarithms.

Practical Rule.

The practical rule deduced from the above conclusions is the following, and given in the words of the Astronomer Royal.

“ To the constant logarithm 5,0134 add $L.t, \frac{1}{2}a$ and $L.$
 “ $vs \overline{D + d}$; the sum diminished by 20 in the index is the
 “ logarithm of the first part of the value of da in seconds,
 “ which is always negative. To the constant logarithm 5,0134
 “ add $L.t', \frac{1}{2}a$, and $L.vs, \frac{1}{2}\overline{D \sim d}$, the sum diminished by 20
 “ in the index, is the logarithm of the second part in seconds,
 “ which is always affirmative. These two joined together, ac-
 “ cording to their proper signs, will give the approximate value
 “ of da . To its logarithmic versed sine, add $L.t', a$ and con-
 “ stant logarithm 5,3144, the sum, diminished by 20 in the
 “ index, will be the logarithm of the third part in seconds,
 “ which will be negative or affirmative, according as a is less
 “ or more than 90° . This applied according to its sign, to the

“ approximate value of $d a$, will give the correct value of $d a$.
 “ If the third part comes out considerable, it should be com-
 “ puted anew with the last value of $d a$. The value of $d a$,
 “ finally corrected, applied to a , will give A , the angle between
 “ the chords.”

In the application of the above rule, to the computation of such corrections as may be applied to the angles of any triangles in this survey, it is manifest that the last step may be entirely neglected on account of the smallness of the *approximate* value of $d a$, whose versed sine is one of the arguments. Being, therefore, confined to the use of the two first steps, the operation is very short. An example is here given in the computation of the correction for reducing the angle at Chanctonbury Ring in the 39th triangle, given in the last account (see Phil. Trans. for 1795, p. 492), to that formed by the chords.

EXAMPLE.

Constant logarithm	-	-	5,0134	-	-	-	-	5,0134
Log. tang. $\frac{1}{2} a = 78^\circ 56'$	-		10,7112	Log. co. tang. $\frac{1}{2} a$	-	-		9,2887
Log. $vs. \frac{1}{2} \cdot \overline{H + b} = 19' 53'',5$			5,2237	Log. $vs. \frac{1}{2} \cdot \overline{H - b} = 5' 53'',5$				4,1669
			0,9483	+			.8'',88	
								- 2,4690 + 0'',03
1st correction	-		8,88					
2d correction	+		0,03					
								- 8,85 the correction required.

SECTION SECOND.

Calculation of the Sides of the great Triangles, carried on from the Termination of the Series, published in the Philosophical Transactions of the Year 1795, along the Coasts of Dorsetshire, Devonshire, and Cornwall, to the Land's End.

Distance from Wingreen to Nine Barrow Down, 130224,5 Feet (see Phil. Trans. for 1795).

No. of triangles	Names of stations.	Observed angles.	Diff.	Spherical excess.	Error.	Angles corrected for calculation.	Distances.
							Feet.
XLIII.	Wingreen -	54 29 36,5	-0,4	"	"	54 29 36	
	Bull Barrow -	93 33 0,25	-0,91			93 32 59	
	Nine Barrow Down	31 57 25,5	-0,4			31 57 25	
		180 0 2,25		1,72	+0,53		
	Bull Barrow from { Wingreen - - 69058 Nine Barrow Down - - 106213						
XLIV.	Black Down -	56 30 18,75	-0,53			56 30 18,5	
	Nine Barrow Down	38 58 19,25	-0,89			38 58 19	
	Bull Barrow -	84 31 23,25	-0,57			84 31 22,5	
		180 0 1,25		1,99	-0,74		
	Black Down from { Nine Barrow Down - 126782 Bull Barrow - - 80103,8						
XLV.	Mintern -	101 39 30,5	-0,36			101 39 30	
	Bull Barrow -	46 54 34	-0,09			46 54 33,5	
	Black Down -	31 25 57,5	-0,11			31 25 56,5	
		180 0 2		0,59	+1,41		
	Mintern from { Bull Barrow - - 42653,4 Black Down - - 59730						

No. of triangles	Names of stations.	Observed angles.	Diff.	Spherical excess.	Error.	Angles corrected for calculation.	Distances.
		° ' "	"	"	"	° ' "	Feet.
XLVI.	Pilsden - -	44 37 53,25	-0,29	"	"	44 37 53	
	Mintern Hill -	68 30 46,5	-0,36			68 30 46	
	Black Down -	66 51 21,25	-0,36			66 51 21	
		180 0 1		1	-0,02		
	Pilsden from {						
	Mintern Hill -						78177
	Black Down -						79110,7
XLVII.	Charton Common	47 39 18,5	-0,10			47 39 18,5	
	Black Down -	27 15 14	-0,21			27 15 16	
	Pilsden - -	105 5 26	-0,60			105 5 25,5	
		179 59 58,5		0,88	-2,38		
	Charton Common from {						
	Black Down -						103345
	Pilsden - -						49106,3
XLVIII.	Dumpdon -	38 33 22,75	-0,12			38 33 22,25	
	Pilsden - -	47 32 1,25	-0,14			47 32 1	
	Charton Common	93 54 37,25	-0,36			93 54 36,75	
		180 0 1,25		0,66	+0,59		
	Charton Common from {						
	Dumpdon - -						49016,3
	Pilsden - -						78459,3
XLIX.	Little Haldon -	25 8 1,25	-0,45			25 8 1	
	Charton Common	68 12 51,25	-0,48			68 12 51	
	Dumpdon -	86 39 8,5	-0,78			86 39 8	
		180 0 1		0,66	+0,34		
	Little Haldon from {						
	Charton Common -						136353
	Dumpdon -						126831

27

62951
80547,8

No. of triangles	Names of stations.	Observed angles.	Diff.	Spherical excess.	Error.	Angles corrected for calculation.	Distances.
							Feet.
LIV.	Bolt Head -	62 56 36,5	-0,41	"	"	62 56 35,25	
	Furland -	53 15 35	-0,38			53 15 34,75	
	Butterton -	63 47 50,75	-0,43			63 47 50	
		180 0 2,25		1,23	+ 1,02		
	Bolt Head from { Furland Butterton						81152 72479,8
LV.	Maker Heights	45 54 37	-0,42			45 54 37,5	
	Bolt Head -	48 39 24,5	-0,33			48 39 24,5	
	Butterton -	85 25 58	-0,59			85 25 58	
		179 59 59,5		1,29	- 1,79		
	Maker Heights from { Bolt Head Butterton						100591 75760,8
LVI.	Maker Heights	112 18 8,75	-1,09			112 18 8	
	Butterton -	35 30 28,75	-0,17			35 30 29	
	Carraton Hill -	32 11 23	-0,10			32 11 23	
		180 0 0,5		1,36	- 0,86		
	Carraton Hill from { Butterton Maker Heights						131576 82600,3
LVII.	Lansallos -	64 7 44,25	-0,44			64 7 44	
	Maker Heights	48 39 54,75	-0,36			48 39 54,5	
	Carraton Hill -	67 12 21,75	-0,43			67 12 21,5	
		180 0 0,75		1,24	- 0,49		
	Lansallos from { Maker Heights Carraton Hill						84631,4 68929,7

By the latter triangle we get the distance from Lansallos to Carraton Hill 68929,7 feet; which being obtained from the least number of triangles, we shall make use of in the calculations of the sides farther to the westward. The same conclusion, however, is nearly obtained by making the computations pass through the triangles connected with Kit Hill and the station on Bindown.

Distance from Butterson to Maker Heights 75760,8 feet.

No. of triangles	Names of stations.	Observed angles.	Diff.	Spherical excess.	Error.	Angles corrected for calculation.	Distances.
							Feet.
LVIII.	Kit Hill - -	48 36 46,75	- 0,26	"	"	48 36 46,75	
	Butterson - -	42 11 38,75	- 0,20			42 11 38,75	
	Maker Heights	89 11 34,5	- 0,75			89 11 34,5	
		180 0 0		1,21	- 1,21		
	Kit Hill from {						
	Butterson - -						100969
	Maker Heights - -						67822,3
LIX.	Bindown - -	75 9 24,5	- 0,28			75 9 24,25	
	Maker Heights	51 29 22,5	- 0,17			51 29 22,25	
	Kit Hill - -	53 21 13,75	- 0,22			53 21 13,5	
		180 0 0,75		0,70	+ 0,05		
	Bindown from {						
	Maker Heights - -						56294,8
	Kit Hill - -						54902,7
LX.	Carraton Hill	91 45 22,5				91 45 23	
	Kit Hill - -	50 45 31				50 45 31	
	Bindown - -	37 29 5,75				37 29 6	
		179 59 59,25		0,42	- 1,17		
	Carraton Hill from {						
	Kit Hill - -						33427
	Bindown - -						42541,4
LXI.	Lansallos - -	32 36 43,25				32 36 42,25	
	Bindown - -	119 9 36,25				119 9 35,25	
	Carraton Hill	28 13 43,25				28 13 42,5	
		180 0 2,75		0,33	+ 2,42		
	Lansallos from Bindown - -						37335,3

By the last triangle we get the distance from Lansallos to Carraton 68931 feet. We shall, however, as before observed, use the distance between those stations as derived from the LVII. triangle.

No. of triangles	Names of stations.	Observed angles.	Diff.	Spherical excess.	Error.	Angles corrected for calculation.	Distances.
		° ' "	" "	" "	" "	° ' "	Feet.
LXII.	Lansallos -	54 57 44	- 0,26	"	"	54 57 44	
	Carraton Hill	56 21 17	- 0,27	"	"	56 21 17	
	Bodmin Down	68 40 59	- 0,30	"	"	68 40 59	
		180 0 0		0,82	- 0,82		
	Bodmin Down from { Carraton Hill - - -						60582,7
	Lansallos - - -						61597,1
LXIII.	Hensbarrow Beacon	66 59 23,25	- 0,23			66 59 22,25	
	Bodmin Down	67 59 27,75	- 0,21			67 59 26,75	
	Lansallos -	45 1 11,75	- 0,19			45 1 11	
		180 0 2,75		0,63	+ 2,12		
	Hensbarrow Beacon from Bodmin Down -						47337,2

By this last triangle, the distance from Hensbarrow Beacon to Lansallos is found to be 62044,8 feet, and by the following triangle

LXIV.	Hensbarrow Beacon	42 32 8,5	- 0,20			42 32 8	
	Carraton Hill	37 28 58	- 0,18			37 28 57,5	
	Lansallos -	99 58 55,75	- 0,59			99 58 54,5	
		180 0 2,25		0,99	+ 1,26		
	Hensbarrow Beacon from Carraton Hill -						100416

we get 62044,7 feet for the same distance.

LXV.	Deadman -	56 12 22,75	- 0,25			56 12 22,5	
	Lansallos -	52 34 3	- 0,24			52 34 2,5	
	Hensbarrow Beacon	71 13 35,25	- 0,35			71 13 35	
		180 0 1		0,82	+ 0,18		
	Deadman from { Lansallos - -						70686,8
	Hensbarrow Beacon -						59284,2

Trigonometrical Survey.

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No. of triangles	Names of stations.	Observed angles.	Diff.	Spherical excess.	Error.	Angles corrected for calculation.	Distances.
		° ' "	"	"	"	° ' "	Fect.
LXVI.	St. Agnes' Beacon	34 31 20,25	-0,31			34 31 19,25	
	Hensbarrow Beacon	77 20 29,5	-0,54			77 20 28,75	
	Deadman -	68 8 13	-0,63			68 8 12	
		180 0 2,75		1,32	+1,43		
	St. Agnes' Beacon from { Hensbarrow Beacon - 97084,8 Deadman - - 102066						
LXVII.	St. Agnes' Beacon	75 51 53,75	-0,40			75 51 53,5	
	Deadman -	25 51 24,75	-0,30			25 51 25,25	
	Karnbonellis -	78 16 41	-0,40			78 16 41,25	
		179 59 59,5		1,06	-1,56		
	Karnbonellis from { Deadman - - - 101084 St. Agnes' Beacon - - - 45461,9						
LXVIII.	Karnminnis - -	32 30 0,25	-0,22			32 30 0,25	
	St. Agnes' Beacon	57 46 31,25	-0,35			57 46 31	
	Karnbonellis -	89 43 29	-0,53			89 43 28,75	
		180 0 0,5		0,77	-0,27		
	Karnminnis from { St. Agnes' Beacon - 84610,6 Karnbonellis - - 71578,3						
LXIX.	St. Buryan -	41 43 45,5	-0,03			41 43 45,25	
	Karnbonellis -	26 22 59,25	-0,09			26 22 59,25	
	Karnminnis -	111 53 16	-0,65			111 53 15,5	
		180 0 0,75		0,75	0,0		
	St. Buryan from { Karnbonellis - - - 99786 Karnminnis - - - 47786,7						

No. of triangles	Names of stations.	Observed angles.	Diff.	Spherical excess.	Error.	Angles corrected for calculation.	Distances.
LXX.	Pertinney - Karnminnis - St. Buryan -	$\begin{array}{r} 0' \\ 113\ 40\ 15,5 \\ 13\ 48\ 18 \\ 52\ 31\ 27,5 \\ \hline 180\ 0\ 1 \end{array}$	"	"	"	$\begin{array}{r} 0' \\ 113\ 40\ 15 \\ 13\ 48\ 18 \\ 52\ 31\ 27 \\ \hline 0,16\ +0,84 \end{array}$	Feet. Pertinney from { Karnminnis - - 41407,7 St. Buryan - - 12450,2
LXXI.	Sennen - - St. Buryan - - Pertinney - -	$\begin{array}{r} 36\ 39\ 18,75 \\ 75\ 36\ 11,5 \\ 67\ 44\ 31 \\ \hline 180\ 0\ 1,25 \end{array}$				$\begin{array}{r} 36\ 39\ 18,25 \\ 75\ 36\ 11 \\ 67\ 44\ 30,75 \\ \hline 0,08\ +1,17 \end{array}$	 Sennen from { St. Buryan - - 19300,8 Pertinney - - 20199,9

The angles in the above series of triangles, are those arising from taking the means of the several observations: and the same rules have been adopted for their corrections, which were laid down in the account of the trigonometrical operation, published in the *Philosophical Transactions* for 1795. The angle at Blackdown in the XLVII. triangle (for the triangles of the present series are numbered in order from those of the former), is considered to be nearly 2" in defect, and has been augmented for calculation accordingly: the angle at that station was observed under circumstances less favourable, than those which attended the observations made on Pilsden, and Charton Common.

SECTION THIRD.

Heights of the Stations. Terrestrial Refractions.

ART. I. *Elevations and Depressions.*

At Wingreen.

The ground at Bull Barrow - - depressed 6 3

At Nine Barrow Down.

The ground at Black Down - - depr. 3 29
at Bull Barrow - - elevated 1 25

At Black Down.

The ground at Nine Barrow Down - depr. 13 26
at Charton Common - depr. 15 11
at Mintern Hill - - 0 0
at Bull Barrow - - depr. 1 16
at Pilsden - - - depr. 0 50

At Pilsden Hill.

The ground at Black Down - - depr. 11 0
at Charton Common - depr. 28 39

The horizon of the sea on the 6th of June,
at 6 P. M. in a S. E. direction, nearly, depr. 29 23

At Bull Barrow.

The ground at Wingreen - - depr. 4 53
at Mintern - - - depr. 6 5
at Black Down - - - depr. 10 39

On Charton Common.

The ground at Black Down	-	-	ó	ó
at Pilsden	-	-	elev.	20 37
at Haldon	-	-	depr.	3 33

At Dumpdon.

The ground at Pilsden	-	-	depr.	3 45
at Charton	-	-	depr.	22 12
The bottom of the Karn, or heap of stones, (nearly on a level with the axis of the tele- scope) on Cawsand Beacon	-	-	elev.	4 42

At Haldon.

The ground at Charton	-	-	depr.	15 59
at Cawsand Beacon	-	-	elev.	24 3
at Rippin Tor	-	-	elev.	40 49
at Furland	-	-	depr.	16 6
The horizon of the sea on the 27th of July, at 6 P. M. in a S. W. direction, nearly,			depr.	27 24

On Cawsand Beacon.

The ground at Rippin Tor	-	-	depr.	17 42
at Haldon	-	-	depr.	38 57
The lamp at Dumpdon	-	-	depr.	29 36
N. B. The lamp was about $5\frac{1}{2}$ feet from the ground.				

On Rippin Tor.

The ground at Butterson	-	-	depr.	23 38
at Cawsand Beacon	-	-	elev.	8 3
at Haldon	-	-	depr.	49 31

At Furland.

The ground at Haldon	-	-	elev. 5 27
at Butterton	-	-	elev. 20 15

At Butterton.

The ground at Kit Hill	-	-	-	depr. 10 49
at Carraton	-	-	-	depr. 9 0
at Maker Heights	-	-	-	depr. 41 48
at the Bolt Head	-	-	-	depr. 41 48
at Furland	-	-	-	depr. 32 18
at Rippin Tor	-	-	-	elev. 13 54

On Maker Heights.

The ground at Lansallos	-	-	-	depr. 1 27
at Bindown	-	-	-	elev. 11 32
at Carraton Hill	-	-	-	elev. 27 36
at Kit Hill	-	-	-	elev. 29 45
at Butterton	-	-	-	elev. 30 45
at the Bolt Head	-	-	-	depr. 5 47

At the Bolt Head.

The ground at Maker	-	-	-	depr. 7 42
at Butterton	-	-	-	elev. 31 6

At Kit Hill.

The ground at Butterton	-	-	-	depr. 1 42
at Maker Heights	-	-	-	depr. 37 38
at Bindown	-	-	-	depr. 31 0
at Carraton Hill	-	-	-	elev. 9 38

On Carraton Hill.

The ground at Lansallos	-	-	-	depr. 41 18
at Hensbarrow	-	-	-	depr. 13 27
at Maker Heights	-	-	-	depr. 39 30
at Bindown	-	-	-	depr. 47 48
at Butterson	-	-	-	depr. 9 48
at Kit Hill	-	-	-	depr. 15 19

On Bindown.

The ground at Maker Heights	-	-	-	depr. 19 41
at Carraton Hill	-	-	-	elev. 41 20
at Lansallos	-	-	-	depr. 16 24
at Hensbarrow	-	-	-	elev. 7 10
at Kit Hill	-	-	-	elev. 22 51

At Lansallos.

The ground at Carraton Hill	-	-	-	elev. 30 18
at Bindown	-	-	-	elev. 10 46
at Kit Hill	-	-	-	elev. 15 27
at Bodmin Down	-	-	-	elev. 2 56
at Hensbarrow	-	-	-	elev. 23 57
at the Deadman	-	-	-	depr. 11 39
at Maker Heights	-	-	-	depr. 10 30

On Bodmin Down.

The ground at Hensbarrow	-	-	-	elev. 24 3
at Lansallos	-	-	-	depr. 12 9

On Hensbarrow Beacon.

The ground at Carraton	-	-	depr.	0	36
at Lansallos	-	-	depr.	33	23
at the Deadman	-	-	depr.	42	8
at St. Agnes' Beacon	-	-	depr.	21	53
at Bodmin Down	-	-	depr.	31	21

At the Deadman.

The ground at Karnbonellis	-	-	elev.	7	51
at St. Agnes' Beacon	-	-	elev.	0	19
at Hensbarrow	-	-	elev.	33	30
at Lansallos	-	-	elev.	1	30

At St. Agnes' Beacon.

The ground at Karnminnis	-	-	elev.	2	11
at Karnbonellis	-	-	elev.	12	45
at Hensbarrow	-	-	elev.	8	8
at the Deadman	-	-	depr.	14	15

On Karnbonellis.

The ground at St. Agnes' Beacon	-	-	depr.	19	51
at Karnminnis	-	-	depr.	5	51
at St. Buryan	-	-	depr.	20	56
at the Deadman	-	-	depr.	22	18

On Karnminnis.

The ground at St Buryan	-	-	depr.	32	9
at Karnbonellis	-	-	depr.	4	30
at St. Agnes' Beacon	-	-	depr.	14	12
at Pertinney Hill	-	-	depr.	9	14

On Carraton Hill.

The ground at Lansallos	-	-	-	depr.	41	18
at Hensbarrow	-	-	-	depr.	13	27
at Maker Heights	-	-	-	depr.	39	30
at Bindown	-	-	-	depr.	47	48
at Butterson	-	-	-	depr.	9	48
at Kit Hill	-	-	-	depr.	15	19

On Bindown.

The ground at Maker Heights	-	-	-	depr.	19	41
at Carraton Hill	-	-	-	elev.	41	20
at Lansallos	-	-	-	depr.	16	24
at Hensbarrow	-	-	-	elev.	7	10
at Kit Hill	-	-	-	elev.	22	51

At Lansallos.

The ground at Carraton Hill	-	-	-	elev.	30	18
at Bindown	-	-	-	elev.	10	46
at Kit Hill	-	-	-	elev.	15	27
at Bodmin Down	-	-	-	elev.	2	56
at Hensbarrow	-	-	-	elev.	23	57
at the Deadman	-	-	-	depr.	11	39
at Maker Heights	-	-	-	depr.	10	30

On Bodmin Down.

The ground at Hensbarrow	-	-	-	elev.	24	3
at Lansallos	-	-	-	depr.	12	9

On Hensbarrow Beacon.

The ground at Carraton	-	-	depr. 0 36
at Lansallos	-	-	depr. 33 23
at the Deadman	-	-	depr. 42 8
at St. Agnes' Beacon	-	-	depr. 21 53
at Bodmin Down	-	-	depr. 31 21

At the Deadman.

The ground at Karnbonellis	-	-	elev. 7 51
at St. Agnes' Beacon	-	-	elev. 0 19
at Hensbarrow	-	-	elev. 33 30
at Lansallos	-	-	elev. 1 30

At St. Agnes' Beacon.

The ground at Karnminnis	-	-	elev. 2 11
at Karnbonellis	-	-	elev. 12 45
at Hensbarrow	-	-	elev. 8 8
at the Deadman	-	-	depr. 14 15

On Karnbonellis.

The ground at St. Agnes' Beacon	-	-	depr. 19 51
at Karnminnis	-	-	depr. 5 51
at St. Buryan	-	-	depr. 20 56
at the Deadman	-	-	depr. 22 18

On Karnminnis.

The ground at St Buryan	-	-	depr. 32 9
at Karnbonellis	-	-	depr. 4 30
at St. Agnes' Beacon	-	-	depr. 14 12
at Pertinney Hill	-	-	depr. 9 14

At St. Buryan.

The ground at Karnminnis	-	-	elev. 24 32
at Karnbonellis	-	-	elev. 6 50

N. B. 6" must be subtracted from the elevations, and added to the depressions, on account of the error in the parallelism of the line of collimation of the telescope, and the rod attached to its side, upon which the level is hung.

The axis of the telescope was about $5\frac{1}{2}$ feet from the ground at all the above stations.

ART. II. *Terrestrial Refractions.*

Between	Mean Refraction.	
Maker and Kit Hill	-	$\frac{1}{7}$ of the contained arc.
Butterton and Kit Hill	-	$\frac{1}{8}$
Bindown and Lansallos	-	$\frac{1}{9}$
Nine Barrow Down and Black Down	-	$\frac{1}{10}$
Maker and Lansallos	-	$\frac{1}{10}$
Maker and the Bolt Head	-	$\frac{1}{10}$
Carraton Hill and Bindown	-	$\frac{1}{11}$
Karnbonellis and St Buryan	-	$\frac{1}{11}$
Maker and Bindown	-	$\frac{1}{12}$
Hensbarrow and the Deadman	-	$\frac{1}{12}$
St. Agnes' Beacon and the Deadman	-	$\frac{1}{12}$
St. Agnes' Beacon and Karnminnis	-	$\frac{1}{12}$
Dumpdon and Cawsand Beacon	-	$\frac{1}{13}$
Haldon and Cawsand Beacon	-	$\frac{1}{13}$
Kit Hill and Bindown	-	$\frac{1}{13}$
Carraton Hill and Hensbarrow	-	$\frac{1}{13}$

Between	Mean Refraction,
Lansallos and the Deadman -	$\frac{1}{13}$ of the contained arc.
Hensbarrow and St. Agnes' Beacon	$\frac{1}{13}$
Karnbonellis and Karnminnis	$\frac{1}{14}$
Furland and Haldon - -	$\frac{1}{15}$
Butterton and Maker -	$\frac{1}{15}$
Butterton and Carraton Hill -	$\frac{1}{15}$
Maker and Carraton Hill -	$\frac{1}{15}$
Karnbonellis and the Deadman	$\frac{1}{15}$
Karnbonellis and St. Agnes' Beacon	$\frac{1}{15}$
Karnminnis and St. Buryan -	$\frac{1}{15}$
Hensbarrow and Bodmin Down	$\frac{1}{15}$
Lansallos and Bodmin -	$\frac{1}{15}$
Butterton and the Bolt Head -	$\frac{1}{15}$
Haldon and Charton Common	$\frac{1}{17}$
Rippin Tor and Cawsand Beacon	$\frac{1}{17}$
Black Down and Bull Barrow	$\frac{1}{18}$
Black Down and Pilsden Hill	$\frac{1}{18}$
Black Down and Charton Common	$\frac{1}{18}$
Lansallos and Hensbarrow -	$\frac{1}{18}$
Rippin Tor and Haldon -	$\frac{1}{19}$
Butterton and Furland -	$\frac{1}{19}$
Butterton and Rippin Tor -	$\frac{1}{21}$
Kit Hill and Carraton -	$\frac{1}{26}$
Pilsden Hill and Charton Common	$\frac{1}{28}$
Wingreen and Bull Barrow -	$\frac{1}{31}$
Lansallos and Carraton Hill -	$\frac{1}{34}$
Haldon and the Horizon of the Sea	$\frac{1}{11}$
Pilsden Hill and the Horizon of the Sea	$\frac{1}{11}$

The mean refractions were found by the following rules.

1. Reduce the elevations, or depressions, to the place of the axis of the telescope at each station, by adding, or subtracting, as the case may require, the angle at the place of observation, subtended by the vertical height between the object, whose elevation or depression was observed, and the axis of the telescope when at that station.*

2. Then, if both are depressions, subtract their sum from the contained arc, and half the remainder is the mean refraction.

3. If one is a depression and the other an elevation, take their difference. Then, if the depression is greater than the elevation, subtract the difference from the contained arc, and half the remainder is the mean refraction. But if the elevation is greatest, add the difference to the contained arc, and half the sum is the mean refraction.

ART. III. *Table containing the Heights of the Stations.*

Stations.			Heights.
Black Down	-	-	817 feet.
Charton Common		-	582
Little Haldon	-	-	818
Rippin Tor	-	-	1549
Furland	-	-	589

* For example. At the station on Hensbarrow, the ground at Bodmin Down was depressed $31' 27''$: the distance of those stations is 47337 feet; and the axis of the telescope was $5\frac{1}{2}$ feet above the ground: therefore, as $47337 : radius :: 5\frac{1}{2} \text{ feet} : tang. 24''$ the angle subtended by $5\frac{1}{2}$ feet at that distance; which, taken from $31' 27''$, gives $31' 3''$ for the depression of the place of the axis, instead of the ground. Again, at Bodmin Down, the ground at Hensbarrow was elevated $23' 57''$, to which adding $24''$, we have $24' 21''$ for the elevation of the place of the axis.

Stations.			Heights.
Butterton	-	-	1203 feet.
Maker Heights	-	-	402
Bull Barrow	-	-	927
Mintern Hill	-	-	891
Pilsden Hill	-	-	934
Dumpdon	-	-	879
Cawsand Beacon	-	-	1792
Bolt Head	-	-	430
Kit Hill	-	-	1067
Bindown	-	-	658
Carraton Hill	-	-	1208
Lansallos	-	-	514
Bodmin Down	-	-	649
Hensbarrow Beacon	-	-	1026
The Deadman	-	-	379
St. Agnes' Beacon	-	-	599
Karnbonellis	-	-	822
Karnminnis	-	-	805
St. Buryan	-	-	415

ART. IV. *Remarks, &c. on the foregoing Table.*

The height of the ground at the station on Maker Heights, 402 feet, was determined by levelling down to low-water mark, near the passage house, below Mount Edgcumbe, on April 15, 1796. This, however, had been done several years before, by some officers of the Royal Engineers, who found it to be 401 feet. The height of the station near Dunnose, in the Isle of Wight, was also found by levelling; of which an account is given in the Philosophical Transactions for 1795. It therefore

may be considered as the least exceptionable mode of procedure, to deduce the intermediate heights from both those stations; for which purpose, the following comparison was made, exhibiting the height of the station on Charton Common, both ways.

Height of Nine Barrow Down (Phil. Trans. 1795, p. 582)	Feet.
of Black Down	642
of Charton Common, <i>deduced from the height of</i>	825
Dunnose	597
Height of Butterson	1201
of Rippin Tor	1545
of Furland	585
of Haldon	811
of Charton Common, <i>deduced from the height of</i>	
Maker	568
<i>from that of Dunnose</i>	597
<i>difference</i>	29

Those are the heights resulting directly from the observations. Now, supposing the difference, or the errors, to arise from the mean refractions, and those errors to be nearly the same between every two stations, we shall obtain the corrected heights in the following manner:

Nine Barrow Down	642	—	4	=	638	
Black Down	825	—	8	=	817	
Charton Common	597	—	15	=	582	
Butterson	1201	+	2	=	1203	
Rippin Tor	1545	+	4	=	1549	
Haldon	811	+	7	=	818	
Charton Common	568	+	14	=	582	

} as in the table.

From those corrected heights, the others to the northward have been deduced. The heights to the westward of Butterson were determined from that of Maker. A mean of two or three results, by using $\frac{1}{15}$ of the contained arcs for refraction, is taken for the height of the station on Mintern Hill.

We subjoin the following elevations and depressions, for the use of those who may wish to examine the tables of heights and refractions, in the Philosophical Transactions for 1795. And here it is to be noted, that the axis of the telescope was always about $5\frac{1}{2}$ feet from the ground, unless the contrary is specified.

At Hanger Hill.

The ground at St. Ann's Hill *depr.* 4 36
at Banstead *elev.* 10 39

At St. Ann's Hill.

The ground at Bagshot Heath	<i>elev.</i> 11 23	} Instrument on the half scaffold: the axis of the telescope $20\frac{1}{2}$ feet high.
at Banstead	<i>elev.</i> 10 2	
at Hanger Hill	<i>depr.</i> 6 13	

The top of the flagstaff near

Hampton Poor House *depr.* 12 54

N. B. The flagstaff was about 41 feet high.

Near Hampton Poor House.

The ground at St. Ann's Hill *elev.* 8 17 Instrument on the whole
scaffold: the axis about $36\frac{1}{2}$ feet high.

At Banstead.

The ground at Leith Hill	<i>elev.</i>	17	29	} On the half scaffold: the axis $20\frac{1}{2}$ feet high.
at Shooter's Hill	<i>depr.</i>	11	7	
at St. Ann's Hill	<i>depr.</i>	22	9	
at Hanger Hill	<i>depr.</i>	22	35	
The top of the flagstaff at Botley Hill	-	-	<i>elev.</i> 18 0	} The staff about 29 feet high.

At Leith Hill.

The top of the flagstaff at Banstead	-	<i>depr.</i>	25	57	} The staff about $27\frac{1}{2}$ feet high.
of the flagst. at Botley Hill		<i>depr.</i>	8	46	
The ground at Hind Head		<i>depr.</i>	8	28	
at Crowborough Beacon		<i>depr.</i>	13	48	
at Ditchling Beacon		<i>depr.</i>	12	34	
at Chanctonbury Ring		<i>depr.</i>	13	10	
The top of Severndroog Castle		<i>depr.</i>	22	9	

N. B. The axis of the telescope when at Shooter's Hill, was about $29\frac{1}{2}$ feet lower than the top of the Castle.

At Shooter's Hill.

The ground at Leith Hill	<i>elev.</i>	2	35
at Banstead	<i>elev.</i>	0	15

On Bagsbot Heath.

The ground at Hind Head	<i>elev.</i>	10	37
at St. Ann's Hill	<i>depr.</i>	12	30

At Hind Head.

The ground at Leith Hill	<i>depr.</i>	2	59
at Chanctonbury Ring	<i>depr.</i>	11	11

The ground at Rook's Hill	<i>depr.</i> 14 51
at Butser Hill	<i>depr.</i> 5 54
at Bagshot Heath	<i>depr.</i> 23 12
at Highclere	<i>depr.</i> 10 42

On Rook's Hill.

The ground at Hind Head	<i>elev.</i> 3 9
at Chanctonbury Ring	<i>depr.</i> 1 35
at Bow Hill -	<i>depr.</i> 1 5
at Portsdown -	<i>depr.</i> 16 22

At Butser Hill.

The ground at Highclere	<i>depr.</i> 9 29
at Hind Head -	<i>depr.</i> 4 44
at Motteston Down	<i>depr.</i> 15 27

At Chanctonbury Ring.

The ground at Rook's Hill	<i>depr.</i> 10 46
at Hind Head	<i>depr.</i> 4 20
at Leith Hill	<i>depr.</i> 1 13
at Beachy Head	<i>depr.</i> 16 27

On the half scaffold: the
axis $20\frac{1}{2}$ feet high.

At Dunnose.

The ground at Nine Barrow	
Down - -	<i>depr.</i> 15 37
at Dean Hill	<i>depr.</i> 17 24

On Ditchling Beacon.

The ground at Leith Hill *depr.* 4 36

On Fairlight Down.

The ground at Beachy Head *depr.* 7 45

at Brightling Windmill *depr.* 0 49 The ground at the Wind-
mill is about 4 feet higher than the axis of the telescope when
at Brightling.

On Brightling Down.

The ground at Fairlight Down *depr.* 7 56

at Beachy Head - *depr.* 8 44

at Crowborough Beacon *elev.* 3 54

At Crowborough Beacon.

The ground at Leith Hill *depr.* 4 8

at Brightling Windmill *depr.* 12 21

at Botley Hill - *depr.* 3 5

At Beachy Head.

The ground at Fairlight Down *depr.* 5 17

at Brightling Windmill *depr.* 1 48

at Chanctonbury Ring *depr.* 5 6

At Dean Hill.

The ground at Highclere *elev.* 0 46

at Beacon Hill *elev.* 4 47

at Wingreen *elev.* 5 5

at Dunnose *depr.* 7 56

At Beacon Hill.

The ground at Highclere	<i>depr.</i> 0' 15"
at Wingreen	<i>depr.</i> 0 34
at Dean Hill	<i>depr.</i> 13 13

At Highclere.

The ground at Hind Head	<i>depr.</i> 10 42
at Butser Hill	<i>depr.</i> 9 26
at Dean Hill	<i>depr.</i> 18 12
at Beacon Hill	<i>depr.</i> 13 15

On Nine Barrow Down.

The ground at Wingreen	<i>depr.</i> 1 20
at Dunnose	<i>depr.</i> 10 8

At Wingreen.

The ground at Beacon Hill	<i>depr.</i> 15 30
at Nine Barrow Down	<i>depr.</i> 17 40
at Dean Hill -	<i>depr.</i> 20 19

SECTION FOURTH.

Containing the secondary Triangles, in which two Angles only have been observed. The first three intersected Places are intended for the small Instrument, on Account of their commanding Situations.

ART. I. Triangles.

Distance from Pilsden Hill to Charton Common 49016,3 Feet.

No.	Triangles.	Observed angles.	Distances of the stations from the intersected objects.	
157	Pilsden - Charton Common Golden Cape	$\begin{array}{ccc} ^{\circ} & ^{\prime} & ^{\prime\prime} \\ 44 & 6 & 35 \\ 36 & 59 & 6 \end{array}$	} Golden Cape {	Feet. 29848 34533

Distance from Rippin Tor to Cawsand Beacon 64020,5 feet.

158	Rippin Tor - Cawsand Beacon Great Haldon	$\begin{array}{ccc} 88 & 2 & 28 \\ 41 & 22 & 57 \end{array}$	} Great Haldon - {	54789 82829
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Distance from the Bolt Head to Maker Heights 100591 feet.

159	Bolt Head - Maker Heights - Hemmerdon Ball	$\begin{array}{ccc} 29 & 15 & 10 \\ 54 & 20 & 9 \end{array}$	} Hemmerdon Ball {	82239 49464
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Distance from Bull Barrow to Wingreen 69058 feet.

160	Bull Barrow - Wingreen - Noil Windmill	$\begin{array}{ccc} 109 & 12 & 12 \\ 33 & 45 & 11 \end{array}$	} Noil Windmill {	63692 108255
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No.	Triangles.	Observed angles.	Distances of the stations from the intersected objects.	
161	Bull Barrow - Wingreen - <i>Noil Steeple</i>	$\begin{smallmatrix} 22 & 4 & 38 \\ 111 & 10 & 59 \end{smallmatrix}$	Noil Steeple -	$\begin{smallmatrix} \text{Feet.} \\ 88420 \\ 35641 \end{smallmatrix}$
162	Bull Barrow - Wingreen - <i>Holy Trinity Steeple, Shaftesbury</i>	$\begin{smallmatrix} 18 & 16 & 15 \\ 65 & 39 & 45 \end{smallmatrix}$	H. Trinity Steeple, Shaftesbury	$\begin{smallmatrix} 63275 \\ 21772 \end{smallmatrix}$
163	Bull Barrow - Wingreen - <i>St. Rumbold's Steeple, Shaftesbury</i>	$\begin{smallmatrix} 15 & 45 & 15 \\ 46 & 55 & 34 \end{smallmatrix}$	St. Rumbold's Steeple, Shaftesbury	$\begin{smallmatrix} 56778 \\ 21104 \end{smallmatrix}$
164	Bull Barrow - Wingreen - <i>Maypowder Steeple</i>	$\begin{smallmatrix} 129 & 15 & 18 \\ 12 & 31 & 19 \end{smallmatrix}$	Maypowder Steeple	$\begin{smallmatrix} 24199 \\ 86426 \end{smallmatrix}$
165	Bull Barrow - Wingreen - <i>Stourhead House</i>	$\begin{smallmatrix} 44 & 25 & 52 \\ 88 & 31 & 14 \end{smallmatrix}$	Stourhead House	$\begin{smallmatrix} 94319 \\ 66050 \end{smallmatrix}$

Distance from Bull Barrow to Nine Barrow Down 106213 feet.

166	Bull Barrow - Nine Barrow Down <i>Mr. Frampton's Obelisk</i>	$\begin{smallmatrix} 32 & 25 & 49 \\ 27 & 44 & 1 \end{smallmatrix}$	Mr. Frampton's Obelisk -	$\begin{smallmatrix} 56980 \\ 65662 \end{smallmatrix}$
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Bull Barrow from Mintern, or Revel's Hill, 42653,4 feet.

167	Bull Barrow - Mintern - <i>Mere Steeple</i>	$\begin{smallmatrix} 97 & 43 & 51 \\ 58 & 1 & 14 \end{smallmatrix}$	Mere Steeple -	$\begin{smallmatrix} 88095 \\ 102912 \end{smallmatrix}$
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No.	Triangles.	Observed angles.	Distances of the stations from the intersected objects.	
168	Bull Barrow - Mintern - <i>Mrs. Thornhill's Obelisk</i>	68° 44' 5" 47 19 3	Mrs. Thornhill's Obelisk -	Feet. 34902 44245
169	Bull Barrow - Mintern - <i>Odcombe Steeple</i>	20 37 56 143 59 47	Odcombe Steeple	94589 56700
170	Bull Barrow - D Mintern - <i>Milborne-port Steeple</i>	52 41 35 77 1 36	Milborne-port Steeple -	54038 44107
171	Bull Barrow - D Mintern - <i>Lord Poulett's, Warren House</i>	7 39 0 132 19 30	Warren House	8829 49035

Distance from Black Down to Pilsden 79110,7 feet.

172	Black Down - Pilsden - <i>Portland Light-house</i>	143 32 28 16 12 4	Light-House -	63749 135775
173	Black Down - Pilsden - <i>Naval-Signal-staff on Puncknoll</i>	32 55 8 13 35 5	Signal-staff at Puncknoll -	25615 59266
174	Black Down - Pilsden - <i>House in Lambert's Castle</i>	29 2 48 62 47 53	Lambert's Castle	74048 13091

No.	Triangles.	Observed angles.	Distances of the stations from the intersected objects.	Feet.
175	Black Down - Pilsden - Lyme Cobb	$\begin{matrix} 26 & 6 & 41 \\ 92 & 54 & 15 \end{matrix}$	Lyme Cobb -	$\begin{matrix} 90349 \\ 39815 \end{matrix}$

Distance from Pilsden to Minterm 78177 feet.

176	Pilsden - Minterm - Glastonbury Tor	$\begin{matrix} 64 & 47 & 55 \\ 78 & 12 & 22 \end{matrix}$	Glastonbury Tor	$\begin{matrix} 127174 \\ 117551 \end{matrix}$
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Distance from Pilsden to Charton Common 49016,3 feet.

177	Pilsden - Charton Common Bridport Beacon, a Sea-mark	$\begin{matrix} 40 & 30 & 43 \\ 62 & 0 & 1 \end{matrix}$	Bridport Beacon	$\begin{matrix} 44332 \\ 32616 \end{matrix}$
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178	Pilsden - Charton Common Barn on the high land near Sidmouth	$\begin{matrix} 15 & 44 & 0 \\ 45 & 18 & 13 \end{matrix}$	Barn on Sidmouth Hill -	$\begin{matrix} 39824 \\ 15191 \end{matrix}$
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Distance from Dumpdon to Pilsden 78459 feet.

179	Dumpdon - Pilsden - Naval-Signal-staff on Whitlands	$\begin{matrix} 50 & 52 & 11 \\ 40 & 22 & 12 \end{matrix}$	Signal-staff on Whitlands -	$\begin{matrix} 50832 \\ 60876 \end{matrix}$
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180	Dumpdon - Pilsden - Catherstone Lodge, Quantock Hills	$\begin{matrix} 93 & 52 & 54 \\ 37 & 51 & 16 \end{matrix}$	Catherstone Lodge	$\begin{matrix} 64521 \\ 104901 \end{matrix}$
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Distance from Charton Common to Dumpdon 58012,4 feet.

No.	Triangles.	Observed angles.	Distances of the stations from the intersected objects.	
181	Charton Common Dumpdon - <i>Lord Lisburne's Obelisk on Haldon</i>	61 11 28 .91 51 33	} Lord Lisburne's Obelisk	Feet. 127936
				112161

Distance from Dumpdon to Cawsand Beacon 181334 feet.

182	Dumpdon - Cawsand Beacon <i>Sir J. de la Pole's Flagstaff, near Sbute House</i>	128 45 59 13 59 24	} Sir J. de la Pole's Flagstaff	72435
				233619
183	Dumpdon - Cawsand Beacon <i>Honiton Steeple</i>	64 18 8 4 0 39	} Honiton Steeple	13650
				175852
184	Dumpdon - Cawsand Beacon <i>St. Mary Ottery Steeple</i>	34 20 21 12 27 16	} St. Mary Ottery Steeple -	53653
				140335

Distance from Little Haldon to Dumpdon 126831 feet.

185	Dumpdon - Little Haldon - <i>Funnel on Sir R. Palk's Tower, Haldon</i>	17 20 53 63 7 37	} Sir R. Palk's Tower	114716
				38347

Distance from Cawsand Beacon to Little Haldon 106508 feet.

186	Cawsand Beacon D Little Haldon - <i>North Bovey Steeple</i>	7 9 50 10 38 19	} North Bovey Steeple - -	64313
				43444

Distance from Little Haldon to Rippin Tor 55988.7 feet.

No.	Triangles.	Observed angles.	Distances of the stations from the intersected objects.	
				Feet.
187	Little Haldon - Rippin Tor - <i>Eastern Karn, or heap of stones, on the high ground near Moreton Hampstead</i>	$\begin{matrix} 34 & 8 & 22 \\ 66 & 14 & 23 \end{matrix}$	} Eastern Karn, near Moreton Hampstead -	$\begin{matrix} 52099 \\ 31944 \end{matrix}$
188	Little Haldon - Rippin Tor - <i>Western Karn, near Moreton Hampstead</i>	$\begin{matrix} 37 & 24 & 5 \\ 69 & 24 & 30 \end{matrix}$	} Western Karn near Moreton Hampstead -	$\begin{matrix} 54751 \\ 35525 \end{matrix}$
189	Little Haldon - Rippin Tor - <i>Naval-Signal-staff at West Down Beacon</i>	$\begin{matrix} 154 & 35 & 29 \\ 11 & 28 & 37 \end{matrix}$	} Naval-Signal-staff, West Down Beacon -	$\begin{matrix} 46268 \\ 99715 \end{matrix}$
190	Little Haldon - Rippin Tor - <i>Mr. Woodley's Summer House</i>	$\begin{matrix} 5 & 43 & 59 \\ 81 & 44 & 20 \end{matrix}$	} Summer House	$\begin{matrix} 55462 \\ 5598 \end{matrix}$
191	Little Haldon Rippin Tor - <i>Naval-Signal-staff, Berry Head, Torbay</i>	$\begin{matrix} 99 & 46 & 2 \\ 42 & 35 & 24 \end{matrix}$	} Signal-staff on Berry Head	$\begin{matrix} 62040 \\ 90345 \end{matrix}$
192	Little Haldon Rippin Tor - <i>Brixen Steeple</i>	$\begin{matrix} 91 & 52 & 49 \\ 48 & 37 & 47 \end{matrix}$	} Brixen Steeple	$\begin{matrix} 66070 \\ 87993 \end{matrix}$

No.	Triangles.	Observed angles.	Distances of the stations from the intersected objects.	
193	Little Haldon Rippin Tor - <i>Ipplepen Steeple</i>	$\begin{matrix} 67 & 8 & 45 \\ 44 & 56 & 5 \end{matrix}$	} Ipplepen Steeple {	Feet. 42675 55677
194	Little Haldon Rippin Tor - <i>Three Barrow Tor,</i> <i>Dartmoor</i>	$\begin{matrix} 20 & 40 & 42 \\ 125 & 6 & 32 \end{matrix}$		81460 35163

Distance from Furland to Little Haldon 72776 feet.

195	Furland - - Little Haldon <i>Brent Tor</i>	$\begin{matrix} 71 & 56 & 33 \\ 51 & 46 & 15 \end{matrix}$	} Brent Tor - {	68727 83180
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Distance from Butterson to Rippin Tor 62951 feet.

196	Butterson - Rippin Tor - <i>Chudleigh Steeple</i>	$\begin{matrix} 17 & 4 & 21 \\ 136 & 27 & 46 \end{matrix}$	} Chudleigh Steeple {	97302 41471
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Distance from Butterson to Furland 80547,8 feet.

197	Butterson - Furland - - <i>Naval-Signal-Staff at</i> <i>Coleton, near Froward</i> <i>Point</i>	$\begin{matrix} 3 & 37 & 11 \\ 140 & 5 & 47 \end{matrix}$	} Naval-Signal-staff at Coleton {	87314 8593
198	Butterson - Furland - - <i>Naval-Signal-staff,</i> <i>Start Point</i>	$\begin{matrix} 39 & 15 & 6 \\ 78 & 26 & 47 \end{matrix}$		89129 57561

No.	Triangles.	Observed angles.	Distances of the stations from the intersected objects.	
199	Butterton - Furland - - <i>Marlborough Steeple</i>	61° 55' 7" 48 18 25	Marlborough Steeple - -	Feet. 64099 75736
200	Butterton - Furland - - <i>Naval-Signal-staff, near the Bolt Head</i>	63 40 32 53 24 17	Naval-Signal-staff on the Bolt Head	72632 81084

Distance from Butterton to Maker Heights 75760,8 feet.

201	Butterton - Maker - - <i>Highest Part of the Mewstone</i>	18 0 46 50 17 40	Mewstone -	62728 25213
202	Butterton - Maker Heights <i>Cupola of the Royal Hospital, Plymouth</i>	6 11 21 44 49 37	Cupola of the Roy- al Hospital	68709 10508
203	Butterton - Maker Heights <i>St. John's Steeple</i>	8 58 35 122 49 11	St. John's Steeple	85401 15856
204	Butterton - Maker Heights <i>Saltash Steeple</i>	19 46 39 75 36 25	Saltash Steeple	73708 25749
205	Butterton - Maker Heights <i>Penlee Beacon</i>	5 36 20 96 23 55	Penlee Beacon	76972 7566

Distance from Butterson to Kit Hill 100969 feet.

No.	Triangles.	Observed angles.	Distances of the stations from the intersected objects.	
				Feet.
206	Butterson - Kit Hill - - <i>Plymstock Steeple</i>	$\begin{smallmatrix} 39^{\circ} & 1' & 33'' \\ 27 & 49 & 38 \end{smallmatrix}$	} Plymstock Steeple {	51259
				69143
207	Butterson - Kit Hill - - <i>Statten Barn</i>	$\begin{smallmatrix} 48 & 3 & 55 \\ 35 & 25 & 31 \end{smallmatrix}$	} Statten Barn {	58906
				75599
208	Butterson - Kit Hill - - <i>Mount Batton</i>	$\begin{smallmatrix} 41 & 56 & 57 \\ 37 & 8 & 33 \end{smallmatrix}$	} Mount Batton {	62087
				68738
209	Butterson - Kit Hill - - <i>Flagstaff in Plymouth Garrison</i>	$\begin{smallmatrix} 39 & 56 & 31 \\ 34 & 45 & 12 \end{smallmatrix}$	} Flagstaff, Plymouth Garrison {	59673
				67207
210	Butterson - Kit Hill - - <i>New Church Steeple at Plymouth</i>	$\begin{smallmatrix} 37 & 21 & 59 \\ 33 & 0 & 38 \end{smallmatrix}$	} New Church Steeple - - {	58399
				65058
211	Butterson - Kit Hill - - <i>Old Church Steeple at Plymouth</i>	$\begin{smallmatrix} 37 & 45 & 52 \\ 34 & 3 & 52 \end{smallmatrix}$	} Old Church Steeple - - {	59524
				65081
212	Butterson - Kit Hill - - <i>West Chimney of the Governor's House, Plymouth Dock</i>	$\begin{smallmatrix} 37 & 5 & 33 \\ 39 & 58 & 36 \end{smallmatrix}$	} Governor's House, Plymouth Dock {	66558
				62479

No.	Triangles.	Observed angles.	Distances of the stations from the intersected objects.	
213	Butterton - Kit Hill - - <i>Flagstaff in the Fort on Mount Wise</i>	$\begin{matrix} 37^{\circ} & 6' & 53'' \\ 40 & 42 & 48 \end{matrix}$	} Flagstaff on Mount Wise -	Feet. 67374 62327
214	Butterton - Kit Hill - - <i>Steeple of the Chapel, Plymouth Dock</i>	$\begin{matrix} 35 & 14 & 20 \\ 41 & 25 & 1 \end{matrix}$		68653 59874
215	Butterton - Kit Hill - - <i>Flagstaff in St. Nicholas' Island</i>	$\begin{matrix} 41 & 40 & 8 \\ 38 & 38 & 52 \end{matrix}$	} Flagstaff in St. Nicholas' Island	63970 68097
216	Butterton - Kit Hill - - <i>Obelisk at Crimbill Passage</i>	$\begin{matrix} 38 & 40 & 39 \\ 42 & 48 & 20 \end{matrix}$		69376 63803
217	Butterton - Kit Hill - - <i>East Pinnacle on Mount Edgcumbe House</i>	$\begin{matrix} 40 & 29 & 28 \\ 42 & 49 & 3 \end{matrix}$	} Mount Edgcumbe House -	69096 66012
218	Butterton - Kit Hill - - <i>Flagstaff on Maker Tower</i>	$\begin{matrix} 41 & 54 & 7 \\ 45 & 25 & 27 \end{matrix}$		72001 67507
219	Butterton - Kit Hill - - <i>Naval-Signal-staff, near Maker Tower</i>	$\begin{matrix} 41 & 53 & 45 \\ 45 & 35 & 55 \end{matrix}$	} Naval-Signal-staff near Maker Tower	72207 67490

No.	Triangles.	Observed angles.	Distances of the stations from the intersected objects.
220	Butterton - Kit Hill - - <i>Chestow Steeple</i>	$\begin{matrix} 12 & 40 & 29 \\ 138 & 21 & 13 \end{matrix}$	$\left. \begin{matrix} \text{Chestow Steeple} \end{matrix} \right\} \begin{matrix} \text{Feet.} \\ 138522 \\ 45738 \end{matrix}$

Distance from Butterton to Carraton Hill 131576 feet.

221	Butterton - Carraton Hill - <i>Stonehouse Steeple</i>	$\begin{matrix} 40 & 34 & 1 \\ 23 & 29 & 2 \end{matrix}$	$\left. \begin{matrix} \text{Stonehouse Steeple} \end{matrix} \right\} \begin{matrix} 58310 \\ 95162 \end{matrix}$
222	Butterton - Carraton Hill - <i>Obelisk at Puslinch</i>	$\begin{matrix} 60 & 48 & 52 \\ 16 & 41 & 16 \end{matrix}$	$\left. \begin{matrix} \text{Obelisk at Puslinch} \end{matrix} \right\} \begin{matrix} 38700 \\ 117659 \end{matrix}$
223	Butterton - Carraton Hill - <i>Rame Head</i>	$\begin{matrix} 41 & 2 & 54 \\ 39 & 30 & 40 \end{matrix}$	$\left. \begin{matrix} \text{Rame Head} \end{matrix} \right\} \begin{matrix} 84846 \\ 87594 \end{matrix}$

Distance from Kit Hill to Maker Heights 67822,3 feet.

224	Kit Hill - - Maker Heights - <i>Brent Tor, near Lidford</i>	$\begin{matrix} 116 & 24 & 26 \\ 24 & 3 & 10 \end{matrix}$	$\left. \begin{matrix} \text{Brent Tor} \end{matrix} \right\} \begin{matrix} 43421 \\ 95419 \end{matrix}$
225	Kit Hill - - Maker Heights - <i>Flag-staff of the Block House, near Dock</i>	$\begin{matrix} 11 & 30 & 56 \\ 46 & 26 & 51 \end{matrix}$	$\left. \begin{matrix} \text{Block House} \end{matrix} \right\} \begin{matrix} 57984 \\ 15972 \end{matrix}$
226	Kit Hill - - Maker Heights - <i>Rame Steeple</i>	$\begin{matrix} 4 & 3 & 42 \\ 141 & 4 & 23 \end{matrix}$	$\left. \begin{matrix} \text{Rame Steeple} \end{matrix} \right\} \begin{matrix} 74547 \\ 8403 \end{matrix}$

Distance from Carraton Hill to Maker Heights 82600.3 feet.

No.	Triangles.	Observed angles.	Distances of the stations from the intersected objects.	
227	Carraton Hill - Maker Heights - <i>Steeple of the Chapel in the Yard, Ply- mouth Dock</i>	$\begin{matrix} 7 & 28 & 15 \\ 64 & 48 & 50 \end{matrix}$	} Dock-yard Chapel {	Feet. 78468 11274
228	Carraton Hill - Maker Heights - <i>Windmill at Plymouth Dock</i>	$\begin{matrix} 7 & 34 & 6 \\ 71 & 29 & 35 \end{matrix}$		79778 11080
229	Carraton Hill - Maker Heights - <i>Battery on Statten Heights</i>	$\begin{matrix} 7 & 31 & 7 \\ 133 & 32 & 55 \end{matrix}$	} Statten Battery {	97488 17199

Distance from Kit Hill to Carraton Hill 33427 feet.

230	Kit Hill - - Carraton Hill - <i>St. Stephen's Steeple</i>	$\begin{matrix} 105 & 0 & 39 \\ 43 & 47 & 30 \end{matrix}$	} St. Stephen's Stee- ple - - {	44659 62330
231	Kit Hill - - Carraton Hill - <i>St. Ive Steeple</i>	$\begin{matrix} 29 & 11 & 14 \\ 47 & 42 & 54 \end{matrix}$		25390 16736
232	Kit Hill - - Carraton - - <i>Callington Steeple</i>	$\begin{matrix} 42 & 31 & 4 \\ 10 & 20 & 54 \end{matrix}$	} Callington Steeple {	7532 28336
233	Kit Hill - - Carraton Hill - <i>Linkinhorn Steeple</i>	$\begin{matrix} 25 & 20 & 11 \\ 28 & 8 & 55 \end{matrix}$		19621 17798

No.	Triangles.	Observed angles.	Distances of the stations from the intersected objects.	
234	Kit Hill - - D Carraton Hill - <i>St. Dominic Steeple</i>	$121^{\circ} 48' 23''$ $9^{\circ} 59' 38''$	} St. Dominic Steeple {	Feet. 7776 38097
235	Kit Hill - - D Carraton Hill - <i>South Petherwin Steeple</i>	$60^{\circ} 22' 24''$ $67^{\circ} 55' 47''$		39475 37027
236	Kit Hill - - Carraton Hill - <i>South Hill Steeple</i>	$19^{\circ} 31' 2''$ $15^{\circ} 22' 32''$	} South Hill Steeple {	15493 19522
237	Kit Hill - - Carraton Hill - <i>Lord Mount Edg- cumbe's House, at Empercombe</i>	$108^{\circ} 14' 2''$ $48^{\circ} 46' 11''$		House at Emper- combe - { 64348 81266
238	Kit Hill - - Carraton Hill - <i>Northern Sea-mark on the Hoe</i>	$59^{\circ} 59' 7''$ $42^{\circ} 59' 43''$	} Sea-mark on the Hoe - - {	66387 87011

Distance from Kit Hill to Bindown 54902,7 feet.

239	Kit Hill - - Bindown - <i>St. Cleer Steeple</i>	$39^{\circ} 56' 21''$ $51^{\circ} 25' 10''$	} St. Cleer Steeple {	42931 35256
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Distance from Carraton Hill to Bindown 42541.4 feet.

No.	Triangles.	Observed angles.	Distances of the stations from the intersected objects.	
240	Carraton Hill - Bindown - - <i>The highest part of Brownwilly</i>	130° 14' 2" 26 32 44	} Brownwilly - {	Feet. 48221
				82371
241	Carraton Hill - Bindown - - <i>Cheese Rings</i>	138 42 49 7 21 53	} Cheese Rings - {	9773
				50300
242	Carraton Hill - Bindown - - <i>Liskeard Steeple</i>	18 2 57 17 6 59	} Liskeard Steeple {	21739
				22885
243	Carraton Hill - Bindown - - <i>Duloe Steeple</i>	18 6 21 84 32 47	} Duloe Steeple - {	43403
				13550
244	Carraton Hill - Bindown - - <i>Menheniot Steeple</i>	9 16 26 14 32 34	} Menheniot Steeple {	21502
				13806
245	Carraton Hill - Bindown - - <i>Landrake Steeple</i>	43 17 44 75 46 11	} Landrake Steeple {	47177
				33376
246	Carraton Hill - Bindown - - <i>Naval-Signal-staff at Nealand, near Polparrow</i>	22 51 23 129 59 13	} Signal-staff at Nealand - {	36203
				71413

No.	Triangles.	Observed angles.	Distances of the stations from the intersected objects.	
234	Kit Hill - -	121 48 23	} St. Dominic Steeple {	Feet. 7776
D	Carraton Hill - <i>St. Dominic Steeple</i>	9 59 38		38097
235	Kit Hill - -	60 22 24	} South Petherwin Steeple - {	39475
D	Carraton Hill - <i>South Petherwin Steeple</i>	67 55 47		37027
236	Kit Hill - -	19 31 2	} South Hill Steeple {	15493
	Carraton Hill - <i>South Hill Steeple</i>	15 22 32		19522
237	Kit Hill - -	108 14 2	} House at Empercombe - {	64348
	Carraton Hill - <i>Lord Mount Edgumbe's House, at Empercombe</i>	48 46 11		81266
238	Kit Hill - -	59 59 7	} Sea-mark on the Hoe - - {	66387
	Carraton Hill - <i>Northern Sea-mark on the Hoe</i>	42 59 43		87011

Distance from Kit Hill to Bindown 54902,7 feet.

239	Kit Hill - -	39 56 21	} St. Cleer Steeple {	42931
	Bindown - <i>St. Cleer Steeple</i>	51 25 10		35256

Distance from Carraton Hill to Bindown 42541.4 feet.

No.	Triangles.	Observed angles.	Distances of the stations from the intersected objects.	
240	Carraton Hill - Bindown - - <i>The highest part of Brownwilly</i>	$\begin{smallmatrix} 130^{\circ} & 14' & 2'' \\ 26 & 32 & 44 \end{smallmatrix}$	Brownwilly - {	Feet. 48221 82371
241	Carraton Hill - Bindown - - <i>Cheese Rings</i>	$\begin{smallmatrix} 138^{\circ} & 42' & 49'' \\ 7 & 21 & 53 \end{smallmatrix}$	Cheese Rings - {	9773 50300
242	Carraton Hill - Bindown - - <i>Liskeard Steeple</i>	$\begin{smallmatrix} 18^{\circ} & 2' & 57'' \\ 17 & 6 & 59 \end{smallmatrix}$	Liskeard Steeple {	21739 22885
243	Carraton Hill - Bindown - - <i>Duloe Steeple</i>	$\begin{smallmatrix} 18^{\circ} & 6' & 21'' \\ 84 & 32 & 47 \end{smallmatrix}$	Duloe Steeple - {	43403 13550
244	Carraton Hill - Bindown - - <i>Menheniot Steeple</i>	$\begin{smallmatrix} 9^{\circ} & 16' & 26'' \\ 14 & 32 & 34 \end{smallmatrix}$	Menheniot Steeple {	21502 13806
245	Carraton Hill - Bindown - - <i>Landrake Steeple</i>	$\begin{smallmatrix} 43^{\circ} & 17' & 44'' \\ 75 & 46 & 11 \end{smallmatrix}$	Landrake Steeple {	47177 33376
246	Carraton Hill - Bindown - - <i>Naval-Signal-staff at Nealand, near Polparrow</i>	$\begin{smallmatrix} 22^{\circ} & 51' & 23'' \\ 129 & 59 & 13 \end{smallmatrix}$	Signal-staff at Nealand - {	36203 71413

Distance from Lansallos to Carraton Hill 68929,7 feet.

No.	Triangles.	Observed angles.	Distances of the stations from the intersected objects.	
247	Carraton Hill - Lansallos - - <i>Boconnock Steeple</i>	$\begin{smallmatrix} 25^{\circ} & 5' & 53'' \\ 35 & 41 & 57 \end{smallmatrix}$	} Boconnock Steeple {	Feet. 46079 33495
248	Carraton Hill - Lansallos - - <i>Obelisk at Boconnock, (Lord Camelford's)</i>	$\begin{smallmatrix} 24 & 4 & 10 \\ 41 & 27 & 47 \end{smallmatrix}$		50139 30886
249	Carraton Hill - Lansallos - - <i>Roach Rock</i>	$\begin{smallmatrix} 41 & 29 & 10 \\ 94 & 48 & 32 \end{smallmatrix}$	} Roach Rock - {	99410 66086
250	Carraton Hill - Lansallos - - <i>Roach Steeple</i>	$\begin{smallmatrix} 42 & 1 & 28 \\ 94 & 41 & 58 \end{smallmatrix}$		100214 67314

Distance from Lansallos to Hensbarrow Beacon 62044,8 feet.

251	Lansallos - Hensbarrow Beacon <i>Helmen Tor</i>	$\begin{smallmatrix} 21 & 34 & 34 \\ 46 & 16 & 45 \end{smallmatrix}$	} Helmen Tor - {	48412 24633
252	Lansallos - Hensbarrow Beacon <i>Mr. Tremaine's Summer House</i>	$\begin{smallmatrix} 37 & 8 & 29 \\ 70 & 7 & 42 \end{smallmatrix}$		61105 39231
253	Lansallos - Hensbarrow Beacon <i>Gorran Steeple</i>	$\begin{smallmatrix} 45 & 34 & 10 \\ 72 & 3 & 29 \end{smallmatrix}$	} Gorran Steeple {	66624 50008

No.	Triangles.	Observed angles.	Distances of the stations from the intersected objects.	
254	Lansallos - - Hensbarrow Beacon <i>Naval-Signal-staff on the Deadman</i>	$\begin{smallmatrix} 52^{\circ} & 43' & 25'' \\ 71 & 28 & 51 \end{smallmatrix}$	} Naval-Signal-staff at the Deadman {	Feet. 71136 59696
255	Lansallos - - Hensbarrow Beacon <i>Gwineas Rocks</i>	$\begin{smallmatrix} 51 & 21 & 9 \\ 60 & 17 & 27 \end{smallmatrix}$		57977 52133

Distance from Bodmin Down to Hensbarrow Beacon 47337,2 feet.

256	Bodmin Down Hensbarrow Beacon <i>Hendellion Steeple</i>	$\begin{smallmatrix} 97 & 21 & 30 \\ 39 & 57 & 45 \end{smallmatrix}$	} Hendellion Steeple {	44851 69255
257	Bodmin Down Hensbarrow Beacon <i>The high Stone on St. Braeg Down</i>	$\begin{smallmatrix} 48 & 38 & 46 \\ 55 & 1 & 58 \end{smallmatrix}$		39924 36571
258	Bodmin Down Hensbarrow Beacon <i>St. Dennis Steeple</i>	$\begin{smallmatrix} 13 & 28 & 31 \\ 120 & 37 & 11 \end{smallmatrix}$	} St. Dennis Steeple {	56722 15359
259	Bodmin Down D Hensbarrow Beacon <i>Lansallos Steeple</i>	$\begin{smallmatrix} 64 & 55 & 8 \\ 68 & 45 & 47 \end{smallmatrix}$		61011 59285

Deadman Head from Lansallos 70686,8 feet.

260	Deadman - - D Lansallos - - <i>St. Veep Steeple</i>	$\begin{smallmatrix} 12 & 51 & 38 \\ 73 & 45 & 53 \end{smallmatrix}$	} St. Veep Steeple {	67986 15761
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Lansallos from Bodmin Down 61597,1 feet.

No.	Triangles.	Observed angles.	Distances of the stations from the intersected objects.	
				Feet.
261	Lansallos - -	26° 19' 35"	} Lanlivery Steeple {	39552
D	Bodmin Down <i>Lanlivery Steeple</i>	33 51 19		31486

Hensbarrow Beacon from Deadman Head 59284,2 feet.

262	Hensbarrow Beacon	30° 50' 7"	} Gerrans Steeple {	83901
D	Deadman - <i>Gerrans Steeple</i>	106 31 21		44858
263	Hensbarrow Beacon	13 56 6	} St. Michael Car- hayes Steeple {	48309
D	Deadman - <i>St. Michael Carhayes Steeple</i>	43 10 53		17001
264	Hensbarrow Beacon	31 22 22	} St. Kivern Steeple {	136676
	Deadman - <i>St. Kivern Steeple</i>	128 53 52		91426
265	Hensbarrow Beacon	29 6 51	} Signal-staff at Black Head {	146770
	Deadman - <i>Naval-Signal-staff at Black Head</i>	133 59 31		99260
266	Hensbarrow Beacon	62 46 29	} Fowey Windmill {	45036
	Deadman - <i>Windmill near Fowey</i>	45 59 37		55677
267	Hensbarrow Beacon	56 10 33	} Menabilly House {	35221
	Deadman - <i>Menabilly House</i>	36 24 22		49300

No.	Triangles.	Observed angles.	Distances of the stations from the intersected objects.	
268	Hensbarrow Beacon Deadman - <i>Old Tower at Polruan</i>	6° 28' 23" 49 6 10	} Old Tower at Pol- ruan -	Feet. 47561 54749
269	Hensbarrow Beacon Deadman - <i>Naval-Signal-staff at St. Anthony's Head</i>	30 52 0 116 42 13		98759 56717

Distance from Hensbarrow Beacon to St. Agnes' Beacon 97084.8 feet.

270	Hensbarrow Beacon D St. Agnes' Beacon <i>St. Columb Minor Steeple</i>	31 37 12 28 56 16	} St. Columb Minor Steeple -	53942 58448
271	Hensbarrow Beacon D St. Agnes' Beacon <i>Peranzabulo Steeple</i>	11 43 0 31 9 39		73829 28975
272	Hensbarrow Beacon St. Agnes' Beacon <i>St. Eval Steeple</i>	57 24 41 35 11 34	} St. Eval Steeple	56011 81884
273	Hensbarrow Beacon St. Agnes' Beacon <i>Cubert Steeple</i>	15 2 26 30 37 20		69141 35224
274	Hensbarrow Beacon St. Agnes' Beacon <i>Flagstaff in Pendennis Castle</i>	41 44 14 72 36 24	} Pendennis Castle	101687 70938

No.	Triangles.	Observed angles.	Distances of the stations from the intersected objects.	
275	Hensbarrow Beacon St. Agnes' Beacon <i>Windmill near St. Mawes</i>	$\begin{matrix} ^\circ & ' & '' \\ 42 & 11 & 25 \\ 61 & 3 & 38 \end{matrix}$	Windmill near St. { Mawes - {	Feet. 87286 66985

Distance from St. Agnes' Beacon to Karnminnis 84610,6 feet.

276	St. Agnes' Beacon Karnminnis <i>Karnbre Castle</i>	$\begin{matrix} 49 & 20 & 11 \\ 20 & 23 & 49 \end{matrix}$	Karnbre Castle {	$\begin{matrix} 31435 \\ 68417 \end{matrix}$
277	St. Agnes' Beacon Karnminnis <i>Cupola of the Market House in Redruth</i>	$\begin{matrix} 55 & 59 & 58 \\ 17 & 46 & 35 \end{matrix}$	Cupola in Redruth {	$\begin{matrix} 26903 \\ 73054 \end{matrix}$
278	St. Agnes' Beacon Karnminnis <i>Camborn Steeple</i>	$\begin{matrix} 30 & 57 & 7 \\ 21 & 45 & 40 \end{matrix}$	Camborn Steeple {	$\begin{matrix} 39427 \\ 54696 \end{matrix}$
279	St. Agnes' Beacon Karnminnis <i>Illugan Steeple</i>	$\begin{matrix} 31 & 12 & 56 \\ 10 & 49 & 6 \end{matrix}$	Illugan Steeple {	$\begin{matrix} 23718 \\ 65490 \end{matrix}$
280	St. Agnes' Beacon Karnminnis <i>St. Paul Steeple</i>	$\begin{matrix} 40 & 52 & 42 \\ 117 & 47 & 27 \end{matrix}$	St. Paul Steeple {	$\begin{matrix} 110564 \\ 81794 \end{matrix}$
281	St. Agnes' Beacon Karnminnis <i>Lord de Dunstanville's House</i>	$\begin{matrix} 20 & 40 & 33 \\ 10 & 47 & 12 \end{matrix}$	Lord de Dunstanville's House {	$\begin{matrix} 30339 \\ 57237 \end{matrix}$

No.	Triangles.	Observed angles.	Distances of the stations from the intersected objects.	
282	St. Agnes' Beacon Karnminnis <i>Gwinear Steeple</i>	$\begin{smallmatrix} 21^{\circ} 40' 24'' \\ 40^{\circ} 30' 44'' \end{smallmatrix}$	} Gwinear Steeple {	Feet. 62144
				35330
283	St. Agnes' Beacon Karnminnis <i>Mr. Kneil's Obelisk, near St. Ives</i>	$\begin{smallmatrix} 53^{\circ} 24' 45'' \\ 88^{\circ} 37' 42'' \end{smallmatrix}$	} Mr. Kneil's Obelisk {	73889
				59346
284	St. Agnes' Beacon Karnminnis <i>Highest of the Rocks called the Cow and Calf</i>	$\begin{smallmatrix} 141^{\circ} 53' 34'' \\ 20^{\circ} 9' 34'' \end{smallmatrix}$	} Cow and Calf Rocks - {	94650
				169450

Distance from St. Agnes' Beacon to Karnbonellis 45461,9 feet.

285	St. Agnes' Beacon Karnbonellis <i>St. Erme Steeple</i>	$\begin{smallmatrix} 94^{\circ} 43' 5'' \\ 42^{\circ} 10' 34'' \end{smallmatrix}$	} St. Erme Steeple {	44668
				66303
286	St. Agnes' Beacon Karnbonellis <i>St. Allen Steeple</i>	$\begin{smallmatrix} 98^{\circ} 13' 52'' \\ 35^{\circ} 41' 11'' \end{smallmatrix}$	} St. Allen Steeple {	36816
				62462
287	St. Agnes' Beacon Karnbonellis <i>Ludgvan Steeple</i>	$\begin{smallmatrix} 44^{\circ} 12' 31'' \\ 105^{\circ} 49' 41'' \end{smallmatrix}$	} Ludgvan Steeple {	87573
				63469

Distance from Karnminnis to Karnbonellis 71578,3 feet.

288	Karnminnis Karn onellis <i>Windmill near the Lizard</i>	$\begin{smallmatrix} 41^{\circ} 26' 59'' \\ 95^{\circ} 31' 22'' \end{smallmatrix}$	} Lizard Windmill {	104413
				69440

No.	Triangles.	Observed angles.	Distances of the stations from the intersected objects.	
289	Karnminnis Karnbonellis <i>Grade Steeple</i>	$\begin{matrix} 40 & 7 & 0 \\ 100 & 25 & 15 \end{matrix}$	Grade Steeple	Feet. 110762
				72566
290	Karnminnis Karnbonellis <i>Ruan Major Steeple</i>	$\begin{matrix} 38 & 32 & 27 \\ 97 & 30 & 19 \end{matrix}$	Ruan Major Steeple - -	102243
				64256
291	Karnminnis Karnbonellis <i>St. Hilary Steeple</i>	$\begin{matrix} 39 & 52 & 32 \\ 25 & 24 & 25 \end{matrix}$	St. Hilary Steeple	33808
				50519
292	Karnminnis Karnbonellis <i>Castle Dennis (Mr. Rogers's Tower)</i>	$\begin{matrix} 10 & 0 & 52 \\ 74 & 13 & 53 \end{matrix}$	Castle Dennis	69233
				15749

Distance from Karnbonellis to St. Buryan 99786 feet.

293	Karnbonellis St. Buryan <i>Madern Steeple</i>	$\begin{matrix} 9 & 32 & 41 \\ 33 & 51 & 25 \end{matrix}$	Madern Steeple	80908
				24081
294	Karnbonellis D St. Buryan <i>Perranuthno Steeple</i>	$\begin{matrix} 60 & 38 & 57 \\ 49 & 18 & 46 \end{matrix}$	Perranuthno Steeple - -	38552
				44315
295	Karnbonellis D St. Buryan <i>Girnhove Steeple</i>	$\begin{matrix} 76 & 57 & 1 \\ 50 & 25 & 43 \end{matrix}$	Girnhove Steeple	46355
				58583
296	Karnbonellis St. Buryan <i>Naval-Signal-staff, Park Loughs</i>	$\begin{matrix} 60 & 25 & 48 \\ 40 & 43 & 1 \end{matrix}$	Signal-staff -	66344
				88458

Distance from Pertinney to Karnminnis 41407,7 feet.

No.	Triangles.	Observed angles.	Distances of the stations from the intersected objects.
297	Pertinney Karnminnis <i>St. Buryan Steeple</i>	$\begin{array}{ccc} 116 & 12 & 46 \\ 13 & 40 & 7 \end{array}$	$\left. \begin{array}{l} \text{St. Buryan Steeple} \end{array} \right\} \begin{array}{l} \text{Feet.} \\ 12751 \\ 48411 \end{array}$

Distance from St. Buryan to Pertinney 12450,2 feet.

298	St. Buryan Pertinney <i>Chapel Karnbury</i>	$\begin{array}{ccc} 23 & 28 & 57 \\ 58 & 34 & 54 \end{array}$	$\left. \begin{array}{l} \text{Chapel Karnbury} \end{array} \right\} \begin{array}{l} 10728 \\ 5009 \end{array}$
299	St. Buryan Pertinney <i>Naval-Signal-staff, St. Leven's Point</i>	$\begin{array}{ccc} 75 & 36 & 7 \\ 67 & 31 & 4 \end{array}$	$\left. \begin{array}{l} \text{Signal-staff, St.} \\ \text{Leven's Point} \end{array} \right\} \begin{array}{l} 20094 \\ 19169 \end{array}$
300	St. Buryan Pertinney <i>Sennen Steeple</i>	$\begin{array}{ccc} 69 & 21 & 10 \\ 68 & 58 & 0 \end{array}$	$\left. \begin{array}{l} \text{Sennen Steeple} \end{array} \right\} \begin{array}{l} 17475 \\ 17520 \end{array}$

Distance from Sennen to Pertinney 20199,9 feet.

301	Sennen Pertinney <i>Stone near the Land's End</i>	$\begin{array}{ccc} 106 & 43 & 44 \\ 7 & 15 & 12 \end{array}$	$\left. \begin{array}{l} \text{Stone near the} \\ \text{Land's End} \end{array} \right\} \begin{array}{l} 2791 \\ 21173 \end{array}$
302	Sennen Pertinney <i>Longship's Light-house</i>	$\begin{array}{ccc} 126 & 1 & 11 \\ 18 & 6 & 39 \end{array}$	$\left. \begin{array}{l} \text{Longship's Light-} \\ \text{house} \end{array} \right\} \begin{array}{l} 10717 \\ 27883 \end{array}$

The above triangles, and those which follow in this section, are numbered in order from the secondary series, given in the Philosophical Transactions for 1795.

No.	Triangles.	Observed angles.	Distances of the stations from the intersected objects.	
289	Karnminnis Karnbonellis <i>Grade Steeple</i>	$\begin{matrix} 40 & 7 & 0 \\ 100 & 25 & 15 \end{matrix}$	Grade Steeple	Feet. 110762 72566
290	Karnminnis Karnbonellis <i>Ruan Major Steeple</i>	$\begin{matrix} 38 & 32 & 27 \\ 97 & 30 & 19 \end{matrix}$		102243 64256
291	Karnminnis Karnbonellis <i>St. Hilary Steeple</i>	$\begin{matrix} 39 & 52 & 32 \\ 25 & 24 & 25 \end{matrix}$	St. Hilary Steeple	33808 50519
292	Karnminnis Karnbonellis <i>Castle Dennis (Mr. Rogers's Tower)</i>	$\begin{matrix} 10 & 0 & 52 \\ 74 & 13 & 53 \end{matrix}$	Castle Dennis	69233 15749

Distance from Karnbonellis to St. Buryan 99786 feet.

293	Karnbonellis St. Buryan <i>Madern Steeple</i>	$\begin{matrix} 9 & 32 & 41 \\ 33 & 51 & 25 \end{matrix}$	Madern Steeple	80908 24081
294	Karnbonellis St. Buryan <i>Perranuthno Steeple</i>	$\begin{matrix} 60 & 38 & 57 \\ 49 & 18 & 46 \end{matrix}$	Perranuthno Steeple	38552 44315
295	Karnbonellis St. Buryan <i>Girnhove Steeple</i>	$\begin{matrix} 76 & 57 & 1 \\ 50 & 25 & 43 \end{matrix}$	Girnhove Steeple	46355 58583
296	Karnbonellis St. Buryan <i>Naval-Signal-staff, Park Loughs</i>	$\begin{matrix} 60 & 25 & 48 \\ 40 & 43 & 1 \end{matrix}$	Signal-staff	66344 88458

Distance from Pertinney to Karnminnis 41407,7 feet.

No.	Triangles.	Observed angles.	Distances of the stations from the intersected objects.	
297	Pertinney Karnminnis <i>St. Buryan Steeple</i>	$\begin{matrix} 116 & 12 & 46 \\ 13 & 40 & 7 \end{matrix}$	} St. Buryan Steeple {	Feet. 12751 48411

Distance from St. Buryan to Pertinney 12450,2 feet.

298	St. Buryan Pertinney <i>Chapel Karnbury</i>	$\begin{matrix} 23 & 28 & 57 \\ 58 & 34 & 54 \end{matrix}$	} Chapel Karnbury {	10728 5009
299	St. Buryan Pertinney <i>Naval-Signal-staff, St. Leven's Point</i>	$\begin{matrix} 75 & 36 & 7 \\ 67 & 31 & 4 \end{matrix}$		20094 19169
300	St. Buryan Pertinney <i>Sennen Steeple</i>	$\begin{matrix} 69 & 21 & 10 \\ 68 & 58 & 0 \end{matrix}$	} Sennen Steeple {	17475 17520

Distance from Sennen to Pertinney 20199,9 feet.

301	Sennen Pertinney <i>Stone near the Land's End</i>	$\begin{matrix} 106 & 43 & 44 \\ 7 & 15 & 12 \end{matrix}$	} Stone near the Land's End {	2791 21173
302	Sennen Pertinney <i>Longship's Light-house</i>	$\begin{matrix} 126 & 1 & 11 \\ 18 & 6 & 39 \end{matrix}$		10717 27883

The above triangles, and those which follow in this section, are numbered in order from the secondary series, given in the Philosophical Transactions for 1795.

ART. II. *Triangles for ascertaining the Distances of the Eddystone Light-house, from the Flagstaff of Plymouth Garrison, and the Rame-head.*

The ball on the lantern of the Light-house was observed from the stations on Butterson, Kit Hill, and Carraton Hill; and as much uncertainty has heretofore existed, with respect to a knowledge of its true distance from any point in the neighbourhood of Plymouth, observations were made on various arcs of the circle of the instrument, at the two first stations.

The triangles are the following.

Distance from Butterson to Kit Hill 100969 feet.

No.	Triangles.	Observed angles.	Distances of the stations from the intersected objects.	
				Feet.
303	Butterson - -	66° 46' 21"	} Eddystone Light-house - -	121159
	Kit Hill - -	64° 27' 46"		123399
	Eddystone Light-house			

Distance from Butterson to Carraton Hill 131576 feet.

304	Butterson - -	60° 5' 31"	} Eddystone Light-house - -	121158
	Carraton Hill - -	55° 52' 41"		126863
	Eddystone Light-house			

With the distance of the Eddystone Light-house from Kit Hill, and also that of the Flagstaff in Plymouth garrison from the same station, we find the distance from the Light-house to the Flagstaff = 73061 feet;* the observed angle being 29° 42' 34": and, computing with the *data* obtained from the last triangle, and the 223d,

* On referring to the late Mr. SMEATON'S Narrative of the Building of the Eddystone Light-house, it will be found, that, from a trigonometrical process, founded on two bases measured on the Hoe, among other deductions, he concluded the distance between the above objects was 73464 feet; being 403 greater than the distance found by the above computation.

with the observed angle at Carraton Hill = $16^{\circ} 22' 1''$, we get 49435 feet for the distance of the Eddystone Light-house from the building on Rame-head. It may be proper to observe, that the Eddystone Light-house is nearer to the Rame-head than to any other point on the coast.

ART. III. *Triangles for ascertaining the Situations of the Lizard Light-houses; and the Lizard Point.*

Distance from Karnbonellis to Pertinney 101474 feet.

No.	Triangles.	Observed angles.	Distances of the stations from the intersected objects.	
305	Karnbonellis - Pertinney - - <i>Eastern Light-house</i>	$78^{\circ} 49' 28''$ $42^{\circ} 56' 51''$	} Eastern Light-house - -	Feet. 81323 117097
306	Karnbonellis - Pertinney - - <i>Western Light-house</i>	$78^{\circ} 40' 5''$ $43^{\circ} 0' 53''$		81348 116921
307	Karnbonellis - Pertinney - - <i>Naval-Signal-staff</i>	$78^{\circ} 8' 57''$ $42^{\circ} 28' 45''$	} Signal-staff -	79635 115408

Distance from Karnbonellis to St. Buryan 99786 feet.

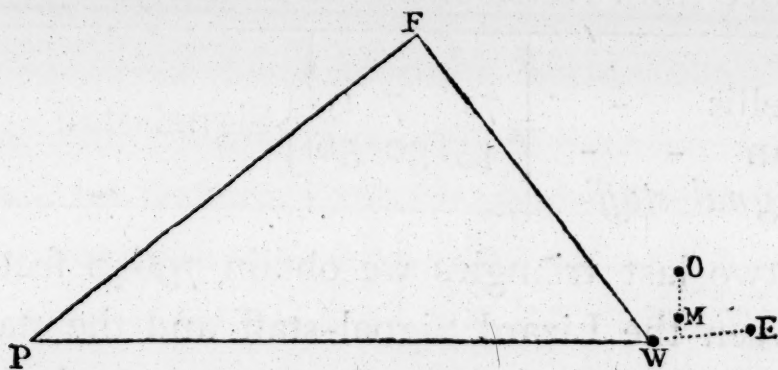
308	Karnbonellis - St. Buryan - - <i>Naval-Signal-staff</i>	$71^{\circ} 7' 19''$ $45^{\circ} 30' 56''$	} Signal-staff -	79645 105873
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From the two last triangles we obtain 79640 feet for the mean distance between the Lizard Signal-staff and the station on Karnbonellis. Computing with this distance, and also that from the Western Light-house to the same station, with the observed angle $0^{\circ} 31' 8''$, we get 1857 feet for the distance between those objects.

For the purpose of ascertaining the situation of the Lizard Point, two angles in the following triangle were observed with a sextant, *viz.*

Naval-Signal-staff	-	77° 4'
Western Light-house	-	60° 50'
<i>Lizard Point</i>		

These, with the computed distance from the Signal-staff to the Light-house, give the distance of the Lizard Point from the {Signal-staff 2419 } feet. Hence, the distance of the point {Light-house 2700 } from the station on Karnbonellis is 81085 feet, the angle at that station, between the Lizard Point and Western Light-house, being $1^{\circ} 53' 47''$. With respect to the means by which the situation of the spot, on which Mr. BRADLEY erected his observatory in 1769, may hereafter be determined, it will be readily understood from the following diagram; where E is the Eastern Light-house, W the Western Light-house, F the Signal-staff, P the Lizard Point, and O the place of the Observatory. The distance between the spot O, and M,* the place where his meridian mark was fixed, we measured and found = 800 feet; M being 24 feet north of the line joining the centres of the Light-houses.



* The person spoken of in Sect. 1. Art. 3. as having the care of the Light-houses, pointed out this spot.

ART. IV. *Triangles for finding the Distances of the Day-Mark, St. Agnes' Light-house, and other Objects in the Scilly Isles, from particular Stations in the West of Cornwall.*

Observations made at Karnminnis.

Between	•	,	"	Mean.
The station at St. Buryan and the Day-Mark	39	3	$22\frac{3}{4}$	"
			$22\frac{3}{4}$	} 23
			$23\frac{3}{4}$	

At St. Buryan.

Karnminnis and the Day-Mark	-	129	52	$22\frac{1}{4}$	} 22
				$22\frac{1}{4}$	
Pertinney and St. Agnes' Light-house	-	83	59	$51\frac{3}{4}$	} 51
				50	
Flagstaff of the fort in St. Mary's and Karnminnis	-	134	39	$45\frac{3}{4}$	} $45\frac{1}{2}$
				45	
Windmill in St. Mary's and Pertinney	-	84	23	$53\frac{1}{2}$	} $53\frac{1}{4}$
				53	

At Pertinney.

St. Agnes' Light-house and Karnminnis		92	6	20	} $21\frac{3}{4}$
				$21\frac{1}{4}$	
				$21\frac{1}{2}$	
				$23\frac{1}{2}$	
Day-Mark and Karnminnis	-	148	11	$8\frac{1}{2}$	} $9\frac{1}{4}$
				$10\frac{1}{4}$	
Flagstaff in St. Mary's and St. Buryan		93	47	18	
Windmill in St. Mary's and St. Buryan		92	26	33	

At Sennen.

Day-Mark and Pertinney	-	145	20	$8\frac{1}{2}$	} $9\frac{1}{4}$
				10	
St. Agnes' Light-house and Pertinney	-	152	43	$24\frac{1}{2}$	} $24\frac{1}{4}$
				$24\frac{1}{2}$	

From those observations, result the following triangles, when the necessary corrections are applied for reducing the observed angles to those formed by the chords, *viz.*

Distance from Karnminnis to St. Buryan 47786,7 feet.

No.	Triangles.	Observed angles cor.	Distances of the stations from the intersected objects.	
309	Karnminnis - - St. Buryan - - Day-Mark	$\begin{array}{ccc}^{\circ} & ' & '' \\ 39 & 3 & 24 \\ 129 & 52 & 19\end{array}$	Day-Mark -	$\left\{ \begin{array}{c} \text{Feet.} \\ 190985 \\ 156796 \end{array} \right.$

Distance from Karnminnis to Pertinney 41407,7 feet.

310	Karnminnis - - Pertinney - - Day-Mark	$\begin{array}{ccc} 25 & 15 & 8 \\ 148 & 11 & 5 \end{array}$	Day-Mark -	$\left\{ \begin{array}{c} 190989 \\ 154551 \end{array} \right.$
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Distance from Sennen to Pertinney 20199,9 feet.

311	Sennen - - Pertinney - - Day-Mark	$\begin{array}{ccc} 145 & 20 & 7 \\ 30 & 24 & 7 \end{array}$	Day-Mark -	$\left\{ \begin{array}{c} 137526 \\ 154568 \end{array} \right.$
312	Sennen - - Pertinney - - St. Agnes' or the Scilly Light-house	$\begin{array}{ccc} 152 & 43 & 20 \\ 24 & 21 & 55 \end{array}$	St. Agnes' Light-house -	$\left\{ \begin{array}{c} 164010 \\ 182199 \end{array} \right.$

Distance from St. Buryan to Pertinney 12450,2 feet.

313	St. Buryan - - Pertinney - - St. Agnes' Light-house	$\begin{array}{ccc} 83 & 59 & 51 \\ 92 & 6 & 22 \end{array}$	St. Agnes' Light-house -	$\left\{ \begin{array}{c} 183096 \\ 182215 \end{array} \right.$
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No.	Triangles.	Observed angles cor.	Distances of the stations from the intersected objects.	
314	St. Buryan - -	83° 24' 53"	Windmill in St. Mary's -	Feet. 172183
	Pertinney - -	92 26 33		171203
	Windmill in St. Mary's			
315	St. Buryan - -	82 8 18	Flagstaff in St. Mary's -	174890
	Pertinney - -	93 47 18		173626
	Flagstaff of the fort in St. Mary's			

The distance from the Day-Mark to Karnminnis, as obtained from the 309th triangle, is 190985 feet, and by the 310th, 190989 feet, which differs only 4 feet from the former; and by the 310th and 311th triangles, the difference of the distances from the same object, to the station on Pertinney, is 17 feet; which, allowing for the shortness of the bases, must be considered as trifling. We may presume, therefore, that had not the Day-Mark been seen from Karnminnis, but from Sennen and Pertinney alone, the observations from which the angles of the 311th triangle are derived, would have afforded the means of computing the distance with sufficient precision. In like manner the 312th and 313th triangles seem to prove, that the observations made to St. Agnes' Light-house were sufficiently accurate, as there is a difference only of 16 feet between the distances of the Light-house from Pertinney. The ball on the top of the Light-house was the object always observed; and the Day-Mark being pyramidical, we had the means of making the observations at the different stations to the same point of this building.

ART. V. *Of the Distances of the Objects in the Scilly Isles, (intersected from the Stations in the West of Cornwall) from Sennen Steeple; the Stone near the Land's End; and the Longship's Light-house.*

As the observations made to the Day Mark, and St. Agnes' Light-house, may be supposed sufficiently accurate; and the ball on the top of the Longship's Light-house was also observed under favourable circumstances, it will be proper to apply the corrections to the horizontal angles, in order to obtain those formed by the chords. Taking, therefore, Pertinney as the angular point, and computing with the following *data, viz.*

Station on Pertinney from	-	$\left\{ \begin{array}{l} \text{Day-Mark} \quad - \quad - \quad = 154551 \\ \text{St. Agnes' Light-house} = 182207 \\ \text{Longship's Light-house} = 27883 \end{array} \right\}$	Feet. And
the angle at Pertinney, augmented for calculation, between the Longship's Light-house and		$\left\{ \begin{array}{l} \text{the Day-Mark} \quad = 12^{\circ} 17' 30'' \\ \text{St. Agnes' Light-house} = 6 \ 15 \ 25 \end{array} \right\}$	We get the distance of
the Longship's Light-house from	-	$\left\{ \begin{array}{l} \text{the Day-Mark} \quad - \quad = 127446 \text{ feet} = 24,14 \\ \text{St. Agnes' Light-house} = 154519 \text{ feet} = 29,06 \end{array} \right\}$	Miles.

Calculating also, with the distances of the two other objects in the Scilly Isles, and likewise those of Sennen Steeple, and the Stone near the Land's End from Pertinney, with the included angles at the same station, we get

			Feet.	Miles.
Sennen Steeple from	-	Day Mark	-	= 139521 = 26,43
		St. Agnes' Light-house	= 166255	= 31,49
		Flagstaff in St. Mary's	= 157912	= 29,95
		Windmill in St. Mary's	= 155299	= 29,41
Stone near the Land's End from	-	Day Mark	-	= 135343 = 25,63
		St. Agnes' Light-house	= 162100	= 30,7
		Flagstaff in St. Mary's	= 153744	= 29,11
		Windmill in St. Mary's	= 151138	= 28,63

Of the Scilly Isles, Menawthen is the nearest to the Land's End, being about $1\frac{2}{10}$ miles eastward of the Day-Mark; and the cluster of rocks, called the Bishop and his Clerks, the most remote, being $3\frac{1}{3}$ miles west of St. Agnes' Light-house. Combining, therefore, the above particulars with those distances, we may conclude, that the nearest part of the Scilly Isles is about 24,7 miles from the Land's End, and the farthest nearly 34.

PART SECOND.

SECTION I.

Account of a Trigonometrical Survey carried on in Kent, in the Years 1795, and 1796, with the small circular Instrument.

ARTICLE I. *Particulars respecting the Instrument.*

The instrument used in this survey was announced in the Philosophical Transactions for 1795, p. 590. It was made by Mr. RAMSDEN; and is about half the size of his large theodolite, or circular instrument, with which we take the horizontal angles, but nearly similar to it in all its parts; consequently a very brief description will be sufficient.

The most material variations in the construction are,

1. The levelling or feet screws. These are below that horizontal movement which serves to direct the lower telescope to any particular object. By this position of the screws, the horizontal circle being once made level, the whole instrument may be moved round without disturbing its horizontality; the levelling screws remaining stationary during that operation,

which cannot be done in the large instrument, because the screws are carried round with it.

2. The diameter of the horizontal circle being only half that of the larger one, it follows, that the space between any two dots on the limb, gives double the number of minutes that are contained in the same space on the greater circle: on this account, each revolution in the micrometer screw in the microscope answers to $2'$; and the circle on the microscopic micrometer being divided into 60 parts, each division becomes equal to $2''$, but for the conveniency of notation, they are numbered at every 5th, with 10, 20, &c. to 50, the 60th being marked 1, to denote $1'$: the number of seconds then commencing as before, the whole revolution becomes $2'$. The revolutions are counted by means of notches on one side of the field in the microscope, in the same manner as in those of the large instrument.

3. This instrument not being intended for determining the direction of the meridian, a vertical semicircle for directing the telescope to the pole star became unnecessary; yet some apparatus was required, whereby small elevations or depressions from the horizon might be ascertained with a tolerable degree of precision. For this purpose, a moveable index, of about four inches long, is made to turn on the horizontal axis of the upper telescope, and so constructed, that by means of a finger screw, it can be fixed firmly in any position. The lower end of this index is furnished with a steel micrometer screw, having a circle on its head, divided into 100 parts, for shewing the fractional parts of a revolution, while other divisions, on a chamfered edge of the index which marks the fractional parts, give the number of revolutions made by the micrometer screw.

The method of finding the value of a revolution of the micrometer head in parts of a degree, &c. was as follows :

A rod, 14 or 16 feet long, was placed horizontally about three quarters of a mile off, and the angle subtended by its ends measured with the instrument in the usual way : the rod was then set up perpendicular at the same place, and the cross wires in the telescope directed to one of its extremities : the telescope was then moved in the vertical plane, by means of the micrometer screw, till the cross wires coincided with the other extremity. In this manner, by counting the number of revolutions, &c. necessary to move the telescope from one position to the other, an angle was measured vertically with the micrometer screw, equal to the former horizontal angle. From repeated trials, the value of a revolution was found equal to $10' 27''$.

This instrument, on account of its portable size, may very readily be taken to the tops of steeples, towers, &c. and is, therefore, extremely well adapted to the uses for which it was intended.

ART. II. *Situations of the Stations on which Observations were made with the small circular Instrument, in the Summer of the Year 1795.*

Folkstone Turnpike, the station made use of by General Roy in 1787.

Hawkinge, about three quarters of a mile from Folkstone Turnpike. This station was chosen for the purpose of having a view of the Belvidere in Waldershare Park, which cannot be seen from the station of 1787.

Dover Castle.

Paddlesworth; about 400 feet from the station of 1787. This new spot was selected, because Hardres Steeple is not visible from the old station.

Waldersbare; on the Belvidere in the Earl of Guilford's Park.

On Ringswold Steeple.

On a sand hill near the sea shore, between Deal and Ramsgate: this station is denominated *Shore*.

Near *Mount Pleasant House*, Isle of Thanet.

On a rising ground near *Wingham*.

On *Chislet Steeple*.

In *Beverley Park*, near Canterbury.

On Upper *Hardres Steeple*.

ART. III. *Triangles for determining the Distances of the Stations.*

As the station on the Keep of Dover Castle, in 1787, was directly over the steps of the Turret, a new point was chosen about $6\frac{1}{2}$ feet from the former, where the instrument could stand conveniently: this new point is about 2,8 feet farther from Folkstone Turnpike, and 1 foot farther from Paddlesworth, than the point marking the old station.

From General Roy's Account of the Trigonometrical Survey in 1787, we have

Dover Castle from Folkstone Turnpike	31554,6	} feet.
from Paddlesworth	42561,2	

Now, augmenting those distances in the proportion of 141747 to 141753 (see Phil. Trans. Vol. LXXX, p. 595, and the Vol.

for 1795, p. 508), we get 31556, and 42563 feet; to which adding 2,8, and 1, respectively, we have

The new point on Dover Castle from Folkstone

Turnpike	-	-	-	-	-	31558,8	} feet.
					from Paddlesworth	42564	

In order to obtain the distance between Waldershare and Dover Castle from those new sides, or distances, the three angles of the following triangle were very carefully taken.

1	{	Dover Castle	-	3° 49' 16"	3° 49' 15"	} for computation.			
		Folkstone Turnpike	36	6	31		36	6	30
		Hawkinge	-	140	4		16	140	4

The third angles of the two next triangles were not observed :

2	{	Hawkinge	-	-	-	44° 23' 30"
		Dover Castle	-	-	-	73° 53' 44"
		<i>Waldershare</i>	-	-	-	61° 42' 46"
3	{	Dover Castle	-	-	-	62° 24' 7"
		Paddlesworth (the station of 1787)	32	36	9	
		<i>Waldershare</i>	-	-	-	84° 59' 44"

By the two first triangles, Dover Feet.

Castle from Waldershare	23019,4	} 23020,5 mean distance.
From the latter	23021,5	

And *Hawkinge* from { Dover Castle 28976
Waldershare 31616

N. B. The angles at the stations, or objects, denoted in *italics*, are supplemental, or were not observed. And it is also to be remarked, that whenever Paddlesworth is mentioned hereafter, the *new station* is to be understood.

No.	Names of stations.	Observed angles.	Distances.	
4	Waldershare Paddlesworth Dover -	$\begin{array}{r} 85^{\circ} \ 2' \ 25'' \\ 32 \ 53 \ 10 \\ 62 \ 4 \ 25 \end{array}$	Paddlesw. { Dover from { Waldershare	$\begin{array}{r} \text{Feet.} \\ 42239 \\ 37460 \end{array}$
5	Waldershare Paddlesworth Hardres	$\begin{array}{r} 57 \ 1 \ 15 \\ 69 \ 21 \ 59 \\ 53 \ 36 \ 46 \end{array}$	Hardres { Waldershare { Paddlesworth	$\begin{array}{r} 43548 \\ 39035 \end{array}$
6	Dover Waldershare Ringswold	$\begin{array}{r} 66 \ 46 \ 45 \\ 57 \ 57 \ 24 \\ 55 \ 15 \ 51 \\ \hline 180 \ 0 \ 0 \end{array}$	Ringswold { Dover { Waldershare	$\begin{array}{r} 23745 \\ 25743 \end{array}$
7	Waldershare Ringswold Shore -	$\begin{array}{r} 45 \ 43 \ 8 \\ 97 \ 38 \ 32 \\ 36 \ 38 \ 20 \end{array}$	Shore { Waldershare { Ringswold	$\begin{array}{r} 42755 \\ 30883 \end{array}$
8	Mount Pleasant Shore - Waldershare	$\begin{array}{r} 40 \ 53 \ 17 \\ 111 \ 8 \ 27 \\ 27 \ 58 \ 16 \end{array}$	Mt. Pleasant { Shore { Waldershare	$\begin{array}{r} 30635 \\ 60920 \end{array}$
9	Mount Pleasant Chislet - Wingham	$\begin{array}{r} 38 \ 32 \ 17 \\ 79 \ 25 \ 36 - 35 \\ 62 \ 2 \ 8 \\ \hline 180 \ 0 \ 1 \end{array}$	Chislet { Mount Pleasant { Wingham	$\begin{array}{r} 30062 \\ 21206 \end{array}$
10	Hardres Wingham Waldershare	$\begin{array}{r} 52 \ 46 \ 14 \\ 69 \ 29 \ 1 \\ 57 \ 44 \ 55 \end{array}$	Hardres from Wingham	39322
11	Wingham Beverley Park Hardres	$\begin{array}{r} 50 \ 4 \ 0 \\ 75 \ 0 \ 0 \\ 54 \ 56 \ 4 - 0 \\ \hline 180 \ 0 \ 4 \end{array}$	Beverley Park { Wingham { Hardres	$\begin{array}{r} 33320 \\ 31215 \end{array}$

ART. IV. Secondary Triangles.

No.	Triangles.	Observed angles.	Distances of the stations from the intersected objects.	
12	Paddlesworth - Waldershare - <i>Barham Windmill</i>	$\begin{smallmatrix} 38 & 28 & 36 \\ 70 & 22 & 24 \end{smallmatrix}$	Windmill -	$\begin{smallmatrix} \text{Feet.} \\ 37283 \\ 24628 \end{smallmatrix}$
13	Dover - - Waldershare <i>St. Radigund's Abbey</i>	$\begin{smallmatrix} 51 & 40 & 11 \\ 44 & 23 & 40 \end{smallmatrix}$	St. Radigund's Ab- bey - -	$\begin{smallmatrix} 16196 \\ 18160 \end{smallmatrix}$
14	Dover - - Waldershare - <i>Hougham Steeple</i>	$\begin{smallmatrix} 75 & 15 & 45 \\ 40 & 31 & 40 \end{smallmatrix}$	Hougham Steeple	$\begin{smallmatrix} 16614 \\ 24726 \end{smallmatrix}$
15	Dover - - Waldershare - <i>Gunston Steeple</i>	$\begin{smallmatrix} 32 & 41 & 51 \\ 17 & 46 & 31 \end{smallmatrix}$	Gunston Steeple	$\begin{smallmatrix} 9111 \\ 16123 \end{smallmatrix}$
16	Dover - - Waldershare - <i>St. Margaret's Steeple</i>	$\begin{smallmatrix} 88 & 19 & 36 \\ 32 & 34 & 23 \end{smallmatrix}$	St. Margaret's Steeple -	$\begin{smallmatrix} 14444 \\ 26817 \end{smallmatrix}$
17	Hawkinge - Waldershare - <i>Elham Windmill</i>	$\begin{smallmatrix} 84 & 50 & 30 \\ 15 & 3 & 14 \end{smallmatrix}$	Elham Windmill	$\begin{smallmatrix} 8335 \\ 31963 \end{smallmatrix}$
18	Dover - - Ringswold - <i>South Foreland Light- house</i>	$\begin{smallmatrix} 39 & 48 & 39 \\ 28 & 8 & 7 \end{smallmatrix}$	South Foreland Light-house	$\begin{smallmatrix} 12081 \\ 16403 \end{smallmatrix}$
19	Waldershare - Ringswold - <i>Upper Deal Windmill</i>	$\begin{smallmatrix} 17 & 10 & 7 \\ 102 & 11 & 7 \end{smallmatrix}$	Upper Deal Wind- mill - -	$\begin{smallmatrix} 28870 \\ 8718 \end{smallmatrix}$

No.	Triangles.	Observed angles.	Distances of the stations from the intersected objects.	
				Feet.
20	Waldershare - Ringswold - <i>Upper Deal Chapel</i>	$\begin{smallmatrix} 22 & 20 & 10 \\ 100 & 38 & 27 \end{smallmatrix}$	} Upper Deal Chapel {	$\begin{smallmatrix} 30160 \\ 11663 \end{smallmatrix}$
21	Waldershare - Ringswold - <i>Lower Deal Windmill</i>	$\begin{smallmatrix} 19 & 1 & 31 \\ 110 & 21 & 19 \end{smallmatrix}$	} Lower Deal Wind- mill - {	$\begin{smallmatrix} 31226 \\ 10857 \end{smallmatrix}$
22	Waldershare - Ringswold - <i>Deal Castle</i>	$\begin{smallmatrix} 19 & 28 & 27 \\ 121 & 2 & 45 \end{smallmatrix}$	} Deal Castle {	$\begin{smallmatrix} 34689 \\ 13498 \end{smallmatrix}$
23	Waldershare - Ringswold - <i>Norbourn Windmill</i>	$\begin{smallmatrix} 42 & 26 & 26 \\ 57 & 41 & 19 \end{smallmatrix}$	} Norbourn Wind- mill - {	$\begin{smallmatrix} 22102 \\ 17648 \end{smallmatrix}$
24	Waldershare - Ringswold - <i>Watch-house near the Sea shore</i>	$\begin{smallmatrix} 9 & 19 & 40 \\ 135 & 28 & 3 \end{smallmatrix}$	} Watch-house {	$\begin{smallmatrix} 31317 \\ 7238 \end{smallmatrix}$
25	Waldershare - Ringswold - <i>Sandown Castle</i>	$\begin{smallmatrix} 29 & 45 & 47 \\ 111 & 20 & 13 \end{smallmatrix}$	} Sandown Castle {	$\begin{smallmatrix} 38185 \\ 20351 \end{smallmatrix}$
26	Waldershare - Ringswold - <i>Walmer Steeple</i>	$\begin{smallmatrix} 12 & 29 & 13 \\ 115 & 33 & 51 \end{smallmatrix}$	} Walmer Steeple {	$\begin{smallmatrix} 29491 \\ 7069 \end{smallmatrix}$
27	Waldershare - Ringswold - <i>Ripple Steeple</i>	$\begin{smallmatrix} 15 & 35 & 53 \\ 69 & 33 & 23 \end{smallmatrix}$	} Ripple Steeple {	$\begin{smallmatrix} 24209 \\ 6947 \end{smallmatrix}$

No.	Triangles.	Observed angles.	Distances of the stations from the intersected objects.*	
28	Waldershare Ringswold - <i>Waldershare Steeple</i>	$\begin{smallmatrix} 20^{\circ} & 45' & 23'' \\ 5 & 35 & 50 \end{smallmatrix}$	Waldershare Stee- ple -	$\begin{smallmatrix} \text{Feet.} \\ 5656 \\ 20552 \end{smallmatrix}$
29	Waldershare Shore - - <i>Eastry Steeple</i>	$\begin{smallmatrix} 16 & 23 & 49 \\ 21 & 57 & 46 \end{smallmatrix}$	Eastry Steeple	$\begin{smallmatrix} 25766 \\ 19448 \end{smallmatrix}$
30	Waldershare Shore - - <i>Ash Steeple</i>	$\begin{smallmatrix} 35 & 10 & 6 \\ 56 & 41 & 26 \end{smallmatrix}$	Ash Steeple -	$\begin{smallmatrix} 35750 \\ 24639 \end{smallmatrix}$
31	Waldershare Shore - - <i>Minster Steeple</i>	$\begin{smallmatrix} 28 & 29 & 39 \\ 103 & 15 & 30 \end{smallmatrix}$	Minster Steeple	$\begin{smallmatrix} 55782 \\ 27341 \end{smallmatrix}$
32	Waldershare - Shore - - <i>Woard Steeple</i>	$\begin{smallmatrix} 5 & 43 & 2 \\ 19 & 37 & 24 \end{smallmatrix}$	Woard Steeple	$\begin{smallmatrix} 33548 \\ 9951 \end{smallmatrix}$
33	Waldershare - Shore - - <i>Sandwich, highest Steeple</i>	$\begin{smallmatrix} 13 & 35 & 31 \\ 59 & 30 & 36 \end{smallmatrix}$	Sandwich Steeple	$\begin{smallmatrix} 38505 \\ 10501 \end{smallmatrix}$
34	Ringswold - Shore - - <i>Mongeham Steeple</i>	$\begin{smallmatrix} 24 & 46 & 49 \\ 13 & 3 & 56 \end{smallmatrix}$	Mongeham Steeple	$\begin{smallmatrix} 11379 \\ 21098 \end{smallmatrix}$
35	Ringswold - Shore - - <i>Norbourn Steeple</i>	$\begin{smallmatrix} 35 & 9 & 0 \\ 25 & 59 & 2 \end{smallmatrix}$	Norbourn Steeple	$\begin{smallmatrix} 15450 \\ 20303 \end{smallmatrix}$

No.	Triangles.	Observed angles.	Distances of the stations from the intersected objects.	
36	Ringswold - Shore - - <i>Woodnessborough Steeple</i>	[°] 33 7 44 77 48 16	} Woodnessborough Steeple -	Feet. 32320 18071
37	Shore - - Mount Pleasant <i>Ramsgate Windmill</i>	41 10 35 47 47 27	} Ramsgate Wind- mill -	22695 20173
38	Shore - - Mount Pleasant <i>St. Lawrence Steeple</i>	36 26 58 54 52 36	} St. Lawrence Stee- ple -	25064 18205
39	Waldershare - Mount Pleasant <i>Wingham Steeple</i>	32 2 55 31 1 14	} Wingham Steeple	35214 36259
40	Waldershare - Mount Pleasant <i>Goodneston Steeple</i>	31 12 40 17 58 32	} Goodneston Stee- ple -	24841 41711
41	Mount Pleasant Chislet - - <i>Birchington Steeple</i>	77 19 0 22 10 4	} Birchington Stee- ple -	11500 29735
42	Mount Pleasant Chislet - - <i>St. Nicholas Steeple</i>	19 36 3 21 19 41	} St. Nicholas Stee- ple - -	16690 15394
43	Mount Pleasant Chislet - - <i>Stormouth Steeple</i>	16 56 56 33 29 54	} Stormouth Stee- ple -	21519 11366

No.	Triangles.	Observed angles.	Distances of the stations from the intersected objects.	
				Feet.
44	Mount Pleasant Chislet - - <i>Reculver Windmill</i>	$\begin{smallmatrix} 22 & 14 & 40 \\ 81 & 14 & 59 \end{smallmatrix}$	} Reculver Windmill {	30556 11703
45	Mount Pleasant Wingham - <i>South Reculver</i>	$\begin{smallmatrix} 69 & 57 & 57 \\ 51 & 54 & 46 \end{smallmatrix}$	} South Reculver {	31012 37017
46	Mount Pleasant Wingham - <i>Hearne Windmill</i>	$\begin{smallmatrix} 50 & 51 & 41 \\ 78 & 50 & 42 \end{smallmatrix}$	} Hearne Windmill {	42669 33732
47	Wingham - Waldershare - <i>Littlebourn Steeple</i>	$\begin{smallmatrix} 102 & 34 & 17 \\ 11 & 3 & 35 \end{smallmatrix}$	} Littlebourn Steeple - {	7752 39442
48	Wingham - Chislet - - <i>Blean Steeple</i>	$\begin{smallmatrix} 58 & 30 & 34 \\ 88 & 52 & 9 \end{smallmatrix}$	} Blean Steeple {	39329 33544
49	Wingham - Chislet - - <i>Wickham Steeple</i>	$\begin{smallmatrix} 59 & 11 & 7 \\ 24 & 25 & 37 \end{smallmatrix}$	} Wickham Steeple {	8824 18326
50	Wingham - Chislet - - <i>Ickham Steeple</i>	$\begin{smallmatrix} 72 & 3 & 26 \\ 22 & 6 & 13 \end{smallmatrix}$	} Ickham Steeple {	8001 20228
51	Wingham - Beverley Park - <i>Bridge Windmill</i>	$\begin{smallmatrix} 47 & 35 & 34 \\ 44 & 59 & 50 \end{smallmatrix}$	} Bridge Windmill {	23584 24628

No.	Triangles.	Observed angles.	Distances of the stations from the intersected objects.	
				Feet.
52	Wingham - Beverley Park - <i>Nackington Steeple</i>	$\begin{smallmatrix} 33^{\circ} 27' 20'' \\ 68^{\circ} 29' 54'' \end{smallmatrix}$	Nackington Steeple -	$\begin{cases} 31688 \\ 18776 \end{cases}$
53	Wingham - Hardres - - <i>Chillendon Windmill</i>	$\begin{smallmatrix} 80^{\circ} 53' 7'' \\ 21^{\circ} 53' 16'' \end{smallmatrix}$	Chillendon Windmill -	$\begin{cases} 15031 \\ 39811 \end{cases}$
54	Wingham - Hardres - - <i>Preston Steeple</i>	$\begin{smallmatrix} 122^{\circ} 1' 10'' \\ 8^{\circ} 3' 28'' \end{smallmatrix}$	Preston Steeple	$\begin{cases} 7220 \\ 43572 \end{cases}$
55	Wingham - Hardres - - <i>Shottenden Windmill</i>	$\begin{smallmatrix} 30^{\circ} 49' 24'' \\ 118^{\circ} 30' 8'' \end{smallmatrix}$	Shottenden Windmill -	$\begin{cases} 67736 \\ 39494 \end{cases}$
56	Hardres - - Beverley Park - <i>St. Martin's Windmill</i>	$\begin{smallmatrix} 11^{\circ} 35' 23'' \\ 27^{\circ} 48' 16'' \end{smallmatrix}$	St. Martin's Windmill -	$\begin{cases} 22943 \\ 9881 \end{cases}$
57	Hardres - - Beverley Park - <i>Harbledown Steeple</i>	$\begin{smallmatrix} 12^{\circ} 11' 37'' \\ 39^{\circ} 25' 30'' \end{smallmatrix}$	Harbledown Steeple - -	$\begin{cases} 25289 \\ 8411 \end{cases}$
58	Hardres - - Beverley Park - <i>Sturry Steeple</i>	$\begin{smallmatrix} 17^{\circ} 29' 59'' \\ 84^{\circ} 3' 53'' \end{smallmatrix}$	Sturry Steeple	$\begin{cases} 31691 \\ 9581 \end{cases}$
59	Waldershare - Hardres - - <i>Canterbury Cathedral</i>	$\begin{smallmatrix} 24^{\circ} 29' 21'' \\ 105^{\circ} 36' 14'' \end{smallmatrix}$	Canterbury Cathedral -	$\begin{cases} 54827 \\ 23597 \end{cases}$

No.	Triangles.	Observed angles.	Distances of the stations from the intersected objects.	
60	Hardres - - Paddlesworth - <i>West - Stone - Street</i> <i>Windmill</i>	$\begin{matrix} ^\circ & ' & '' \\ 40 & 45 & 34 \\ 27 & 23 & 18 \end{matrix}$	} West-Stone-Street Windmill {	Feet. 19347 27458
61	Hardres - - Paddlesworth - <i>Stelling Windmill</i>	$\begin{matrix} 31 & 0 & 20 \\ 15 & 3 & 20 \end{matrix}$		14081 27924

ART. V. *Triangles carried over another Part of Kent in 1795;
with Remarks.*

On account of the high woody lands to the westward of Hardres and Paddlesworth, the triangles could not be extended in that direction, and therefore the following may be considered as a detached part of the Survey this year.

The Stations were,

Westwell Down,

Wye Down,

Brabourn Down,

Allington, or Aldington Knoll, the station of 1787.

Allington Knoll from Tenterden, according to General Roy's account, is 61775,3 feet, which increased in the proportion of 141747 to 141753 becomes 61778 feet. The centre of the top of Tenterden Steeple is about 4 or $4\frac{1}{2}$ feet farther from Allington Knoll than the point marking the station in 1787; therefore the distance of the centre from Allington Knoll will be 61782 feet, which is used in the following computations; because, as a flagstaff of moderate height

cannot be easily distinguished among the pinnacles at any considerable distance, it was thought it might be sufficiently accurate for the present purpose, to intersect the steeple itself.

Triangles for determining the Distances of the Stations.

No.	Stations.	Observed angles.	Distances.	
62	Allington Knoll Westwell Down <i>Tenterden</i>	$\begin{array}{r} 61^{\circ} 37' 46'' \\ 68 \quad 0 \quad 16 \\ 50 \quad 21 \quad 58 \end{array}$	Westwell D. { Tenterden from { Allington K.	Feet. $\begin{array}{r} 58629 \\ 51316 \end{array}$
63	Allington Knoll Westwell Down Wye Down	$\begin{array}{r} 34 \quad 37 \quad 37 \\ 45 \quad 54 \quad 19 \\ 99 \quad 28 \quad 5-4 \\ \hline 180 \quad 0 \quad 1 \end{array}$	Wye Down { Allington K. Westwell D.	$\begin{array}{r} 37363 \\ 29562 \end{array}$
64	Allington Knoll Wye Down <i>Tenterden</i>	$\begin{array}{r} 96 \quad 15 \quad 23 \\ 54 \quad 19 \quad 24 \\ 29 \quad 25 \quad 13 \end{array}$	Wye Down { Allington Tenterden	$\begin{array}{r} 37360 \\ 75603 \end{array}$
65	Wye Down Westwell Down <i>Tenterden</i>	$\begin{array}{r} 45 \quad 8 \quad 41 \\ 113 \quad 54 \quad 35 \\ 20 \quad 56 \quad 44 \end{array}$	Westwell D. from Wye D.	29566
66	Allington Knoll Brabourn Down <i>Tenterden</i>	$\begin{array}{r} 116 \quad 49 \quad 40 \\ 45 \quad 25 \quad 31 \\ 17 \quad 44 \quad 49 \end{array}$	Brabourn D. { Allington K. Tenterden	$\begin{array}{r} 26437 \\ 77397 \end{array}$
67	Allington Knoll Brabourn Down <i>Westwell Down</i>	$\begin{array}{r} 55 \quad 11 \quad 54 \\ 93 \quad 52 \quad 23 \\ 30 \quad 55 \quad 43 \end{array}$	Brabourn D. { Westwell D. Allington K.	$\begin{array}{r} 42233 \\ 26435 \end{array}$

ART. VI. *Secondary Triangles.*

No.	Triangles.	Observed angles.	Distances of the stations from the intersected objects.	
68	Wye Down - Westwell Down <i>Ashford Steeple</i>	$\begin{smallmatrix} 42^{\circ} 20' 58'' \\ 53 \quad 35 \quad 53 \end{smallmatrix}$	} Ashford Steeple {	Feet. 23922 20023
69	Wye Down - Westwell Down <i>Brook Steeple</i>	$\begin{smallmatrix} 86 \quad 44 \quad 28 \\ 15 \quad 18 \quad 43 \end{smallmatrix}$		7983 30181
70	Wye Down - Westwell Down <i>Willsborough Steeple</i>	$\begin{smallmatrix} 60 \quad 6 \quad 18 \\ 45 \quad 28 \quad 29 \end{smallmatrix}$	} Willsborough Steeple - {	21881 26607
71	Wye Down - Westwell Down <i>Willsborough Windmill</i>	$\begin{smallmatrix} 58 \quad 2 \quad 28 \\ 41 \quad 37 \quad 0 \end{smallmatrix}$		19916 25443
72	Wye Down - Westwell Down <i>Kingsnorth Steeple</i>	$\begin{smallmatrix} 58 \quad 20 \quad 46 \\ 65 \quad 40 \quad 7 \end{smallmatrix}$	} Kingsnorth Steeple {	32498 30360
73	Wye Down - Westwell Down <i>Shadoxhurst Steeple</i>	$\begin{smallmatrix} 52 \quad 13 \quad 44 \\ 85 \quad 50 \quad 2 \end{smallmatrix}$		44118 34966
74	Wye Down - Westwell Down <i>Kennington Steeple</i>	$\begin{smallmatrix} 26 \quad 38 \quad 18 \\ 27 \quad 54 \quad 54 \end{smallmatrix}$	} Kennington Steeple - - {	16989 16271
75	Wye Down - Allington Knoll <i>Great Chart Steeple</i>	$\begin{smallmatrix} 62 \quad 23 \quad 7 \\ 54 \quad 24 \quad 4 \end{smallmatrix}$		34029 37083

No.	Triangles.	Observed angles.	Distances of the stations from the intersected objects.	
76	Wye Down - Allington Knoll <i>Westwell Steeple</i>	$\begin{smallmatrix} 96^{\circ} & 45' & 26'' \\ 33 & 49 & 30 \end{smallmatrix}$	} Westwell Steeple {	Feet. 27384 48851
77	Westwell Down Allington Knoll <i>Pluckley Steeple</i>	$\begin{smallmatrix} 97 & 22 & 43 \\ 20 & 53 & 1 \end{smallmatrix}$		20768 57778
78	Westwell Down Allington Knoll <i>Eastwell Steeple</i>	$\begin{smallmatrix} 37 & 55 & 0 \\ 7 & 17 & 0 \end{smallmatrix}$	} Eastwell Steeple {	9168 44441
79	Westwell Down Allington Knoll <i>Charing Steeple</i>	$\begin{smallmatrix} 146 & 22 & 23 \\ 5 & 24 & 0 \end{smallmatrix}$		10211 60085
80	Westwell Down Allington Knoll <i>Allington Steeple</i>	$\begin{smallmatrix} 3 & 15 & 4 \\ 57 & 34 & 51 \end{smallmatrix}$	} Allington Steeple {	49609 3333
81	Brabourn Steeple Allington Knoll <i>Lymne Steeple</i>	$\begin{smallmatrix} 34 & 50 & 49 \\ 75 & 59 & 12 \end{smallmatrix}$		27443 16161
82	Brabourn Down Allington Knoll <i>Mersham Steeple</i>	$\begin{smallmatrix} 33 & 12 & 51 \\ 45 & 9 & 19 \end{smallmatrix}$	} Mersham Steeple {	19136 14784
83	Brabourn Down Allington Knoll <i>Monks Horton Steeple</i>	$\begin{smallmatrix} 67 & 22 & 25 \\ 23 & 46 & 14 \end{smallmatrix}$		10657 24405

The bearings, and distances of the stations and intersected objects, together with their latitudes and longitudes, are given in the following Section.

SECTION II.

Operations in 1796, with the small circular Instrument.

ART. I. *Situations of the Stations.*

Lydd	}	Stations in the Survey of 1787.
Allington Knoll		
High Nook		
Fairlight Down		
Goudhurst		
Tenterden		

Westwell Down Station, used in 1795. See Art. v. Section I.

Part Second.

Silver Hill, near Robertsbridge. The station is 22 yards S. W. of the Windmill.

Boughton Malherb Steeple.

ART. II. *Triangles for finding the Distances of the Stations.*

From the 5th Article in the last Section, we get the distance from *Westwell Down* to the *new* station on *Tenterden Steeple* = 58629,4 feet. This used in the following triangle,

84	Boughton Malherb	81° 55' 9"
	Westwell Down	63 44 8
	Tenterden -	34 20 43

gives the distance from Boughton Malherb to Westwell Down 33409 feet. Also in the following triangle, using 54376,9 feet for the distance from Tenterden to Goudhurst,

85	Goudhurst -	52° 5' 44"
	Boughton Malherb	53 54 20
	Tenterden -	75 59 56
		N

we get 33404,5 feet for the distance between the same stations: hence the mean, 33406,8 feet, may be taken for the true distance between Boughton Malherb and Westwell Down. From this latter triangle also, we obtain the distance from Boughton Malherb to Tenterden 53097,6 feet.

No.	Triangles.	Observed angles.	Distances.	Feet.
86	Goudhurst Silver Hill Tenterden	65° 29' 7" 70 32 26 43 58 27	Silver Hill from Goudhurst	40043,1

Fairlight Down from Tenterden 71637,7 feet.

87	Fairlight Down Silver Hill Tenterden	46° 34' 5" 82 25 8 51 0 47	Silver Hill from Fairlight D.	56174,2
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By the two last triangles, we get 52472,4 and 52481,4 feet for the distances of Tenterden from Silver Hill; the mean of which, 52476,9, we shall hereafter use in determining the distances of the objects, intersected from those stations.

The distance of Goudhurst from Tenterden, and that of Tenterden from Fairlight Down, are derived from those given by General Roy, in the Philosophical Transactions, Vol. LXXX. augmented in the proportion of 141747 to 141753. The distances also, hereafter made use of, between Lydd, and the stations on Fairlight Down, Tenterden Steeple, Allington Knoll, and High Nook, together with that of High Nook from Allington Knoll, are obtained by increasing the distances, found in the same work, in the above proportion. It is proper to

remark, that it has not been thought necessary to reduce the distance between the station on Westwell Down, and the new station on Tenterden Steeple, to that between the former, and the old point at Tenterden, from the trifling difference of those distances.

During the operation of this year, the instrument was also taken to the following stations, *viz.*

Bidenden Steeple,
Hartridge,
Warehorn Steeple,
Stone Crouch,
Iden Steeple.

To determine the distances between these objects, and the stations from whence they were observed, we have the following triangles.

No.	Triangles.	Observed angles.	Distances of the stations from the intersected objects.	
88	Goudhurst - Tenterden - <i>Bidenden Steeple</i>	$\begin{matrix} 18 & 16 & 4 \\ 40 & 0 & 12 \end{matrix}$	} Bidenden Steeple {	Feet. 41100 20040
89	Goudhurst - Tenterden - <i>Hartridge</i>	$\begin{matrix} 27 & 21 & 34 \\ 13 & 14 & 13 \end{matrix}$		19134 38404
90	Allington Knoll Lydd - - <i>Stone Crouch</i>	$\begin{matrix} 44 & 16 & 25 \\ 73 & 7 & 50 \end{matrix}$	} Stone Crouch {	51569 37627
91	Allington Knoll Stone Crouch <i>Warehorn</i>	$\begin{matrix} 15 & 46 & 51 \\ 17 & 18 & 22 \end{matrix}$		28100 25690

No.	Triangles.	Observed angles.	Distances of the stations from the intersected objects.	Feet.
92	Tenterden - Fairlight Down - <i>Iden Steeple</i>	$\begin{matrix} 28 & 55 & 46 \\ 20 & 42 & 7 \end{matrix}$	$\left. \begin{matrix} \text{Iden Steeple} - \end{matrix} \right\}$	$\begin{matrix} 33239 \\ 45483 \end{matrix}$

ART. III. *Secondary Triangles.*

93	Goudhurst - Tenterden - <i>Ulcomb Steeple</i>	$\begin{matrix} 59 & 47 & 4 \\ 61 & 44 & 12 \end{matrix}$	$\left. \begin{matrix} \text{Ulcomb Steeple} \end{matrix} \right\}$	$\begin{matrix} 56184 \\ 55123 \end{matrix}$
94	Goudhurst - Tenterden - <i>Sutton Windmill</i>	$\begin{matrix} 65 & 36 & 50 \\ 52 & 13 & 42 \end{matrix}$	$\left. \begin{matrix} \text{Sutton Windmill} \end{matrix} \right\}$	$\begin{matrix} 48610 \\ 56009 \end{matrix}$
95	Goudhurst - Tenterden - <i>Chart Sutton Steeple</i>	$\begin{matrix} 70 & 48 & 44 \\ 48 & 11 & 12 \end{matrix}$	$\left. \begin{matrix} \text{Chart Sutton Steeple} - - \end{matrix} \right\}$	$\begin{matrix} 46338 \\ 58717 \end{matrix}$
96	Goudhurst - Tenterden - <i>Linton Steeple</i>	$\begin{matrix} 91 & 32 & 50 \\ 36 & 54 & 6 \end{matrix}$	$\left. \begin{matrix} \text{Linton Steeple} \end{matrix} \right\}$	$\begin{matrix} 41690 \\ 69407 \end{matrix}$
97	Goudhurst - Tenterden - <i>Headcorn Windmill</i>	$\begin{matrix} 49 & 11 & 14 \\ 47 & 51 & 2 \end{matrix}$	$\left. \begin{matrix} \text{Headcorn Windmill} - \end{matrix} \right\}$	$\begin{matrix} 40621 \\ 41468 \end{matrix}$
98	Goudhurst - Hartridge <i>Cranbrook Steeple</i>	$\begin{matrix} 29 & 8 & 0 \\ 70 & 10 & 0 \end{matrix}$	$\left. \begin{matrix} \text{Cranbrook Steeple} \end{matrix} \right\}$	$\begin{matrix} 18239 \\ 9439 \end{matrix}$
99	Tenterden - Boughton Malherb <i>Benenden Steeple</i>	$\begin{matrix} 94 & 50 & 33 \\ 24 & 7 & 11 \end{matrix}$	$\left. \begin{matrix} \text{Benenden Steeple} \end{matrix} \right\}$	$\begin{matrix} 24799 \\ 60471 \end{matrix}$

No.	Triangles.	Observed angles.	Distances of the stations from the intersected objects.	
				Feet.
100	Bidenden - Goudhurst - <i>Staplehurst Steeple</i>	$\begin{smallmatrix} 37^{\circ} & 0' & 0'' \\ 38 & 47 & 0 \end{smallmatrix}$	} Staplehurst Steeple {	25514
				26555
101	Bidenden - Goudhurst - <i>Marden Steeple</i>	$\begin{smallmatrix} 33 & 30 & 0 \\ 70 & 42 & 33 \end{smallmatrix}$	} Marden Steeple {	40015
				23399
102	Boughton Malherb Goudhurst - <i>Frittenden Steeple</i>	$\begin{smallmatrix} 14 & 39 & 40 \\ 17 & 10 & 0 \end{smallmatrix}$	} Frittenden Steeple {	36203
				31405
103	Tenterden - Silver Hill - <i>Brasses Windmill</i>	$\begin{smallmatrix} 20 & 46 & 0 \\ 76 & 45 & 52 \end{smallmatrix}$	} Brasses Windmill {	51527
				18768
104	Tenterden - Silver Hill - <i>Hawkhurst Steeple</i>	$\begin{smallmatrix} 11 & 2 & 0 \\ 42 & 17 & 30 \end{smallmatrix}$	} Hawkhurst Steeple {	44028
				12522
105	Silver Hill - Fairlight Down <i>Sandhurst Steeple</i>	$\begin{smallmatrix} 72 & 5 & 37 \\ 17 & 1 & 25 \end{smallmatrix}$	} Sandhurst Steeple {	16448
				53460
106	Silver Hill - Fairlight Down <i>Whittersham Steeple</i>	$\begin{smallmatrix} 58 & 27 & 19 \\ 55 & 42 & 10 \end{smallmatrix}$	} Whittersham Steeple - - {	50861
				52469
107	Silver Hill - Fairlight Down <i>Peasemarsb Steeple</i>	$\begin{smallmatrix} 38 & 49 & 4 \\ 59 & 39 & 33 \end{smallmatrix}$	} Peasemarsb Steeple - - {	49016
				35602

No.	Triangles.	Observed angles.	Distances of the stations from the intersected objects.	
108	Silver Hill - Fairlight Down <i>Rolvenden Steeple</i>	82 8 4 36 28 0	} Rolvenden Steeple {	Feet. 38028 63380
109	Silver Hill - Fairlight Down <i>Beckley Steeple</i>	42 30 35 35 36 7		33419 38790
110	Allington Knoll High Nook - <i>New Church Steeple</i>	46 3 7 36 41 43	} New Church Stee- ple - - {	13967 16828
111	Allington Knoll High Nook - <i>Ivy Church Steeple</i>	52 3 53 76 5 26		28621 23256
112	Allington Knoll High Nook - <i>St. Mary's Steeple</i>	27 21 0 80 5 0	} St. Mary's Steeple {	23939 11165
113	Tenterden - Lydd - - <i>Playden Steeple</i>	34 33 5 34 35 48		40204 40158
114	Iden - - Fairlight Down <i>Winchelsea Steeple</i>	21 57 0 17 5 40	} Winchelsea Stee- ple - - {	21224 26990
115	Winchelsea - Fairlight Down <i>Brede Steeple</i>	48 6 0 67 26 0		26373 21755

No.	Triangles.	Observed angles.	Distances of the stations from the intersected objects.	
				Feet.
116	Brede Steeple - Fairlight Down <i>Icklesham Steeple</i>	$\begin{smallmatrix} 56^{\circ} & 0' & 0'' \\ 55 & 1 & 0 \end{smallmatrix}$	} Icklesham Steeple {	19091
				19313
117	Stone Crouch - Allington Knoll <i>Woodchurch Steeple</i>	$\begin{smallmatrix} 55 & 9 & 34 \\ 32 & 59 & 15 \end{smallmatrix}$	} Woodchurch Steeple - {	28098
				42357
118	Stone Crouch - Allington Knoll <i>Old Romney Steeple</i>	$\begin{smallmatrix} 41 & 36 & 38 \\ 35 & 59 & 39 \end{smallmatrix}$	} Old Romney Steeple - {	31037
				35070
119	Stone Crouch - Allington Knoll <i>New Romney Steeple</i>	$\begin{smallmatrix} 41 & 54 & 7 \\ 52 & 11 & 33 \end{smallmatrix}$	} New Romney Steeple - {	40957
				34544
120	Stone Crouch - Allington Knoll <i>Brookland Steeple</i>	$\begin{smallmatrix} 40 & 47 & 1 \\ 14 & 44 & 21 \end{smallmatrix}$	} Brookland Steeple {	15919
				40872
121	Stone Crouch - Allington Knoll <i>Orleston Steeple</i>	$\begin{smallmatrix} 20 & 16 & 5 \\ 29 & 46 & 58 \end{smallmatrix}$	} Orleston Steeple {	33421
				23308
122	Stone Crouch - Lydd - - <i>East Guilford Steeple</i>	$\begin{smallmatrix} 67 & 14 & 56 \\ 24 & 46 & 59 \end{smallmatrix}$	} East Guilford Steeple - {	15782
				34721
123	Stone Crouch - Lydd - - <i>Snargate Steeple</i>	$\begin{smallmatrix} 53 & 4 & 1 \\ 28 & 2 & 7 \end{smallmatrix}$	} Snargate Steeple {	17900
				30443

No.	Triangles.	Observed angles.	Distances of the stations from the intersected objects.	
124	Stone Crouch - Warehorn Steeple <i>Snave Steeple</i>	$\begin{smallmatrix} ^{\circ} & ' & '' \\ 25 & 37 & 0 \\ 81 & 34 & 0 \end{smallmatrix}$	} Snave Steeple - {	Feet. 26667 11629
125	Stone Crouch - Warehorn - <i>Appledore Steeple</i>	$\begin{smallmatrix} 9 & 11 & 12 \\ 6 & 46 & 0 \end{smallmatrix}$		11016 14925
126	Warehorn - D Allington Knoll <i>Brenzset Steeple</i>	$\begin{smallmatrix} 91 & 6 & 0 \\ 30 & 5 & 41 \end{smallmatrix}$	} Brenzet Steeple {	16476 32852
127	Allington Knoll - Westwell Down <i>Bethersden Steeple</i>	$\begin{smallmatrix} 36 & 36 & 26 \\ 68 & 55 & 44 \end{smallmatrix}$		49701 31762
128	Allington Knoll Westwell Down <i>High Halden Steeple</i>	$\begin{smallmatrix} 49 & 12 & 12 \\ 70 & 39 & 8 \end{smallmatrix}$	} High Halden Stee- ple - {	55827 44793
129	Westwell Down Boughton Malherb <i>Lenham Steeple</i>	$\begin{smallmatrix} 17 & 24 & 40 \\ 64 & 19 & 30 \end{smallmatrix}$		30424 10101
130	Westwell Down Boughton Malherb <i>Egerton Steeple</i>	$\begin{smallmatrix} 12 & 31 & 21 \\ 30 & 1 & 45 \end{smallmatrix}$	} Egerton Steeple {	24722 10711
131	Westwell Down Boughton Malherb <i>Turret on Romden Stables</i>	$\begin{smallmatrix} 42 & 50 & 41 \\ 71 & 6 & 34 \end{smallmatrix}$		34586 24858

No.	Triangles.	Observed angles.	Distances of the stations from the intersected objects.
132	Westwell Down - Boughton Malherb Smarden Steeple	$\begin{matrix} 49 & 12 & 12 \\ 70 & 39 & 8 \end{matrix}$	$\left. \begin{matrix} \text{Smarden Steeple} \end{matrix} \right\} \begin{matrix} \text{Feet.} \\ 39106 \\ 23850 \end{matrix}$

SECTION III.

Containing the Distances of the Objects intersected in the Survey with the small circular Instrument, from the Meridian of Greenwich, and from the Perpendicular to that Meridian. Also their Latitudes and Longitudes.

ART. I. Bearings and Distances, 1795.

At Folkstone turnpike, the bearing of the station on Dover Castle in 1787, from the parallel to the meridian of Greenwich is $65^{\circ} 52' 46''$ NE (See Phil. Trans. Vol. LXXX, page 603). The new point on the Keep is $6\frac{1}{2}$ feet north-eastward from the old one, which will subtend an angle at Folkstone turnpike of about $38''$; therefore the new station bears $65^{\circ} 52' 8''$ NE. The bearing of the centre of Tenterden Steeple from Allington Knoll, is nearly the same as that of the station in 1787, or $85^{\circ} 47' 25''$ SW.: but the distances of those stations (Folkstone turnpike and Allington Knoll, see page 232 of the same Volume), from the meridian of Greenwich, and its perpendicular, are augmented in the proportion of 141747 to 141753, for obtaining the distances in the 3d and 4th columns of the following table: Folkstone turnpike being 274979 and 137220; and Allington Knoll 219935 and 144038 feet, respectively, from the meridian, and its perpendicular.

No.	Triangles.	Observed angles.	Distances of the stations from the intersected objects.	
124	Stone Crouch - Warehorn Steeple <i>Snave Steeple</i>	$\begin{smallmatrix} 25 & 37 & 0 \\ 81 & 34 & 0 \end{smallmatrix}$	} Snave Steeple - {	Feet. 26667 11629
125	Stone Crouch - Warehorn - <i>Appledore Steeple</i>	$\begin{smallmatrix} 9 & 11 & 12 \\ 6 & 46 & 0 \end{smallmatrix}$		11016 14925
126	Warehorn - D Allington Knoll <i>Brenzet Steeple</i>	$\begin{smallmatrix} 91 & 6 & 0 \\ 30 & 5 & 41 \end{smallmatrix}$	} Brenzet Steeple {	16476 32852
127	Allington Knoll - Westwell Down <i>Bethersden Steeple</i>	$\begin{smallmatrix} 36 & 36 & 26 \\ 68 & 55 & 44 \end{smallmatrix}$		49701 31762
128	Allington Knoll Westwell Down <i>High Halden Steeple</i>	$\begin{smallmatrix} 49 & 12 & 12 \\ 70 & 39 & 8 \end{smallmatrix}$	} High Halden Steeple - {	55827 44793
129	Westwell Down Boughton Malherb <i>Lenham Steeple</i>	$\begin{smallmatrix} 17 & 24 & 40 \\ 64 & 19 & 30 \end{smallmatrix}$		30424 10101
130	Westwell Down Boughton Malherb <i>Egerton Steeple</i>	$\begin{smallmatrix} 12 & 31 & 21 \\ 30 & 1 & 45 \end{smallmatrix}$	} Egerton Steeple {	24722 10711
131	Westwell Down Boughton Malherb <i>Turret on Romden Stables</i>	$\begin{smallmatrix} 42 & 50 & 41 \\ 71 & 6 & 34 \end{smallmatrix}$		34586 24858

No.	Triangles.	Observed angles.	Distances of the stations from the intersected objects.	
132	Westwell Down - Boughton Malherb Smarden Steeple	$\begin{array}{ccc}^{\circ} & ' & '' \\ 49 & 12 & 12 \\ 70 & 39 & 8\end{array}$	Smarden Steeple {	Feet. 39106
				23850

SECTION III.

Containing the Distances of the Objects intersected in the Survey with the small circular Instrument, from the Meridian of Greenwich, and from the Perpendicular to that Meridian. Also their Latitudes and Longitudes.

ART. I. Bearings and Distances, 1795.

At Folkstone turnpike, the bearing of the station on Dover Castle in 1787, from the parallel to the meridian of Greenwich is $65^{\circ} 52' 46''$ N E (See Phil. Trans. Vol. LXXX, page 603). The new point on the Keep is $6\frac{1}{2}$ feet north-eastward from the old one, which will subtend an angle at Folkstone turnpike of about $38''$; therefore the new station bears $65^{\circ} 52' 8''$ N E. The bearing of the centre of Tenterden Steeple from Allington Knoll, is nearly the same as that of the station in 1787, or $85^{\circ} 47' 25''$ S W. : but the distances of those stations (Folkstone turnpike and Allington Knoll, see page 232 of the same Volume), from the meridian of Greenwich, and its perpendicular, are augmented in the proportion of 141747 to 141753, for obtaining the distances in the 3d and 4th columns of the following table: Folkstone turnpike being 274979 and 137220; and Allington Knoll 219935 and 144038 feet, respectively, from the meridian, and its perpendicular.

Bearings and Distances of the Stations.

Bearings from the Parallels to the Meridian of Greenwich.				Distances from merid.	Distances from perp.	
				Feet.	Feet.	
<i>At Folkstone Turnpike.</i>						
Dover	-	-	-	65° 52' 8" NE	303780	124318
Hawkinge	-	-	-	29 45 38 NE	276605	134376
<i>At Dover.</i>						
Paddlesworth	-	-	-	81 30 42 SW	262004	130553
Waldershare	-	-	-	36 24 53 NW	290114	105792
Ringswold	-	-	-	30 21 52 NE	315783	103830
<i>At Waldersbare.</i>						
Shore	-	-	-	39 54 35 NE	317545	72997
Mount Pleasant	-	-	-	11 56 19 NE	302716	46190
Wingham	-	-	-	16 36 24 NW	279533	70315
Hardres	-	-	-	74 21 9 NW	248180	94046
Hawkinge	-	-	-	25 17 53 SW		
Ringswold	-	-	-	85 37 43 NE		
<i>Near the Shore.</i>						
Ringswold	-	-	-	3 16 15 SW		
Mount Pleasant	-	-	-	28 56 58 NW		
<i>At Mount Pleasant.</i>						
Wingham	-	-	-	43 51 31 SW		
Chislet	-	-	-	82 23 48 SW	272918	50168
<i>At Wingham.</i>						
Chislet	-	-	-	18 10 37 NW		
Hardres	-	-	-	52 52 37 SW		
Beverley Park	-	-	-	77 3 23 NW	247060	62852
<i>At Beverley Park.</i>						
Hardres	-	-	-	2 3 23 SE		
<i>At Allington Knoll.</i>						
Tenterden	-	-	-	85 47 25 SW		
Westwell Down	-	-	-	32 34 49 NW	192302	100797
Wye Down	-	-	-	2 2 48 NE	221269	106701
Brabourn Down	-	-	-	22 37 5 NE	230102	119636

Interior Objects.

<i>At Dover.</i>						
St. Radigund's Abbey	-	-	-	88 5 4 NW	287597	123777
Hougham Steeple	-	-	-	68 19 22 SW	288341	130455
Gunston Steeple	-	-	-	3 43 2 NW	303189	115226

Bearings from the Parallels to the Meridian of Greenwich.				Distances from merid.	Distances from perp.
				Feet.	Feet.
St. Margaret's Steeple -	-	51 54 43 NE		315148	115408
South Foreland Light-House -	-	70 10 31 NE		315145	120721
<i>At Waldersbare.</i>					
Barham Windmill -	-	61 0 4 NW		278573	93852
Elham Windmill -	-	10 14 39 SW		284430	137246
Upper Deal Chapel -	-	63 17 33 NE		317056	92237
Deal Castle -	-	66 9 16 NE		321842	91768
Watch-house near the Shore -	-	85 2 37 SE		321314	108498
Sandown Castle -	-	55 51 56 NE		321721	84365
Walmer Steeple -	-	73 8 30 NE		318338	97239
Ripple Steeple -	-	70 1 50 NE		302867	97534
Waldershare Steeple -	-	64 52 20 NE		295235	103390
Eastry Steeple -	-	23 30 46 NE		300393	82166
Ash Steeple -	-	4 44 29 NE		293069	70165
Minster Steeple -	-	11 24 56 NE		301155	51113
Woard Steeple -	-	34 11 33 NE		308967	78042
Sandwich highest Steeple -	-	26 19 14 NE		307187	71279
Wingham Steeple -	-	20 6 36 NW		278007	72725
Goodneston Steeple -	-	19 16 21 NW		281915	82343
Littlebourn Steeple -	-	27 39 59 NW		278100	70860
Canterbury Cathedral -	-	49 51 48 NW		248198	60458
<i>At Ringswold.</i>					
Mongeham Steeple -	-	21 30 34 NW		311611	93243
Norbourn Steeple -	-	31 52 45 NW		307623	90710
Woodnesborough Steeple -	-	29 51 29 NW		299693	75800
<i>Near the Shore.</i>					
Ramsgate Windmill -	-	12 13 43 NE		321363	50817
St. Lawrence Steeple -	-	7 30 6 NE		320817	48148
<i>At Mount Pleasant.</i>					
Birchington Steeple -	-	20 17 12 NW		298729	35403
St. Nicholas Steeple -	-	78 0 9 NW		286391	42721
Stormouth Steeple -	-	65 26 52 SW		283143	55132
<i>At Wingham.</i>					
The South Reculver -	-	8 3 15 NW		274346	33663
Hearne Windmill -	-	34 59 11 NW		260191	42679
Blean Steeple -	-	76 41 11 NW		241261	61259
Wickham Steeple -	-	77 21 44 NW		270923	68384
Bridge Windmill -	-	55 21 3 SW		260132	83723
Nackington Steeple -	-	69 29 17 SW		249854	81418
Chillingdon Windmill -	-	28 0 30 SE		286591	83586
Preston Steeple -	-	5 6 13 NW		278891	63124
Shottenden Windmill -	-	83 42 1 SW		212206	77748
Ickham Steeple -	-	89 45 57 SW		271533	70348

Bearings from the Parallels to the Meridian of Greenwich.				Distances from merid.	Distances from perp.
<i>At Hardres.</i>				Feet.	Feet.
Harbledown Steeple	-	-	14 15 0 NW	241955	69535
Sturry Steeple	-	-	15 26 36 NE	256619	63499
West Stone-street Windmill	-	-	35 46 24 SW	236870	109743
Stelling Windmill	-	-	26 1 10 SW	242003	106700
<i>On Westwell Down.</i>					
Ashford Steeple	-	-	24 53 15 SE	200728	118961
Brook Steeple	-	-	63 10 25 SE	219234	114417
Willsborough Steeple	-	-	33 0 39 SE	206797	123109
Kingsnorth Steeple	-	-	12 49 1 SE	199037	130400
Shadoxhurst Steeple	-	-	7 20 54 SW	187830	135476
Kennington Steeple	-	-	50 34 14 SE	204869	111131
<i>At Allington Knoll.</i>					
Great Chart Steeple	-	-	52 21 16 NW	190572	121389
Westwell Steeple	-	-	31 46 42 NW	194208	102510
Pluckley Steeple	-	-	53 27 50 NW	173511	109641
Eastwell Steeple	-	-	25 17 49 NW	200945	103951
Charing Steeple	-	-	37 58 49 NW	182959	96677
Allington Steeple	-	-	25 0 2 NE	221344	141017
Lymne Steeple	-	-	81 23 44 SE	235914	146456
Mersham Steeple	-	-	22 32 14 NW	214269	130383
Monks-Horton Steeple	-	-	46 23 19 NE	237605	127204

ART. II. *Bearings and Distances of the Stations, and Interior
Objects, intersected in 1796.*

<i>At Goudhurst.</i>					
Boughton Maiherb	-	-	54 59 23 NE	159324	95480
Bidenden	-	-	88 49 3 NE	147431	131744
Hartridge	-	-	79 43 33 NE		
<i>At Fairlight Down.</i>					
Silver Hill	-	-	34 28 24 NW		
Iden Steeple	-	-	33 33 48 NE	168454	180711
Brede Steeple	-	-	13 48 32 NW	138116	197485
<i>At Allington Knoll.</i>					
Stone Crouch	-	-	57 3 23 SW	176642	172082
Warehorn Steeple	-	-	72 50 14 SW	193071	152324

Interior Objects.

Bearings from the Parallels to the Meridian of Greenwich.				Distances from merid.	Distances from perp.
				Feet.	Feet.
<i>At Goudhurst.</i>					
Frittenden Steeple	-	-	72 9 23 NE	135894	123079
Linton Steeple	-	-	15 32 17 NE	117510	92425
Chart Sutton Steeple	-	-	36 16 23 NE	133757	95234
Sutton Windmill	-	-	41 28 17 NE	138534	96169
Ulcomb Steeple	-	-	47 18 3 NE	147633	94491
Headcorn Windmill	-	-	57 54 53 NE	140758	111015
Staplehurst	-	-	51 49 3 NE	127216	116176
Cranbrook Steeple	-	-	71 8 27 SE	123602	138488
<i>At Fairlight Down.</i>					
Rolvenden Steeple	-	-	1 59 36 NE	145513	155271
Beckley Steeple	-	-	1 7 43 NE	144072	179830
Peasemash Steeple	-	-	25 11 9 NE	158458	186395
Whittersham Steeple	-	-	21 13 46 NE	162307	169704
Sandhurst Steeple	-	-	17 26 59 NW	127277	167613
Winchelsea Steeple	-	-	50 39 28 NE	164181	201501
Icklesham Steeple	-	-	41 12 28 NW	156031	204073
<i>At Allington Knoll.</i>					
Bethersden	-	-	69 11 15 NW	173469	126373
High Halden	-	-	81 47 1 NW	164672	136054
Orleston Steeple	-	-	86 50 21 SW	196655	145317
Woodchurch Steeple	-	-	89 57 22 NW	177569	144000
Warehorn Steeple	-	-	72 50 14 SW	193071	152324
Brookland Steeple	-	-	42 19 2 SW	192410	174253
Old Romney Steeple	-	-	21 3 44 SW	207322	176759
New Romney Steeple	-	-	4 41 50 SW	217098	178460
<i>At Boughton Malberb.</i>					
Benenden Steeple	-	-	25 12 54 SW	129542	150187
<i>At Silver Hill.</i>					
Brasses Windmill	-	-	40 7 4 SE	123521	187554
<i>At High Nook.</i>					
New Church Steeple	-	-	57 43 31 NW	214018	156687
Ivy Church Steeple	-	-	82 52 46 SW	205170	168562
St. Mary's Steeple	-	-	78 53 12 SW	204756	170287
<i>At Lydd.</i>					
Playden Steeple	-	-	85 1 0 NW	169333	187207

Bearings from the Parallels to the Meridian of Greenwich.				Distances from merid.	Distances from perp.
				Feet.	Feet.
<i>At Westwell.</i>					
Lenham Steeple	-	-	63 25 45 NW	165089	87178
Egerton Steeple	-	-	86 38 14 SW	167621	102243
Smarden Steeple	-	-	61 47 14 SW	157842	119273
Turret on Romden Stables	-	-	56 18 54 SW	163521	119970
<i>At Stone Crouch.</i>					
Appledore Steeple	-	-	30 33 49 NE	182243	162595
Snave Steeple	-	-	65 22 1 NE	200828	160993
Snargate Steeple	-	-	66 35 7 NE	193068	164969
East Guilford Steeple	-	-	6 54 4 SW	174746	187750

ART. III. *Latitudes and Longitudes of Objects intersected in*
1795.

Names of Objects.	Latitude.	Longitude east from Greenwich.	
		In degrees.	In time.
	° ' "	° ' "	m. s.
The Belvidere in Waldershare Park	51 11 13	1 15 39	5 2,6
Ringswold, or Kingswold Steeple	51 11 8	1 22 20	5 29,3
Upper Hardres Steeple	51 13 1	1 4 45	4 19
Chislet Steeple	51 20 4	1 11 24	4 45,6
St. Radigund's Abbey	51 7 56	1 14 44	4 58,9
Hougham Steeple	51 6 50	1 15 4	5 0,3
Gunston Steeple	51 9 18	1 19 0	5 16
St. Margaret's Steeple	51 9 14	1 22 7	5 28,5
South Foreland Light-House	51 8 21	1 22 6	5 28,4
Barham Windmill	51 12 52	1 12 41	4 50,7
Elham Windmill	51 5 44	1 14 1	4 56,1
Upper Deal Chapel	51 13 2	1 22 44	5 30,9
Deal Castle	51 13 5	1 23 59	5 35,9
Watch-house near the sea shore	51 10 21	1 23 46	5 35,1
Sandown Castle	51 14 18	1 23 59	5 35,9
Walmer Steeple	51 15 29	1 23 8	5 32,5
Ripple Steeple	51 12 12	1 19 0	5 16
Waldershare Steeple	51 11 15	1 16 59	5 7,9
Eastry Steeple	51 14 44	1 18 26	5 13,7
Ash Steeple	51 16 44	1 16 34	5 6,3
Minster Steeple	51 19 50	1 18 46	5 15,1
Woard Steeple	51 15 23	1 20 41	5 22,7
Sandwich highest Steeple	51 16 30	1 20 15	5 21
Wingham Steeple	51 16 21	1 12 38	4 50,5
Goodneston Steeple	51 14 45	1 13 26	4 53,7
Littlebourn Steeple	51 16 40	1 11 1	4 44,1
Canterbury Cathedral	51 18 26	1 4 53	4 19,5

Names of objects.	Latitude.	Longitude east from Greenwich.	
		In degrees.	In time.
	° ' "	° ' "	m. s.
Mongeham Steeple - - -	51 12 53	1 21 18	5 25,2
Norbourn, or Northbourn Steeple -	51 13 18	1 20 17	5 21,1
Woodnessborough, or Woodnesbor. Steeple	51 14 47	1 18 16	5 13,1
Ramsgate Windmill - - -	51 19 49	1 24 4	5 36,3
St. Lawrence Steeple - - -	51 20 16	1 23 56	5 43,7
Birchington Steeple - - -	51 22 25	1 16 13	5 4,8
St. Nicholas Steeple - - -	51 21 15	1 14 57	4 59,8
Stourmouth, or Stormouth Steeple -	51 19 8	1 14 3	4 56,2
The South Reculver - - -	51 22 47	1 11 50	4 47,3
Hearne Windmill - - -	51 21 20	1 8 6	4 32,4
Blean Steeple - - -	51 18 19	1 3 4	4 12,3
Wickham Steeple - - -	51 17 5	1 10 48	4 43,2
Ickham Steeple - - -	51 17 47	1 10 7	4 40,5
Bridge Windmill - - -	51 14 35	1 7 55	4 31,7
Nackington Steeple - - -	51 14 59	1 5 14	4 20,9
Chillingdon Windmill - - -	51 14 30	1 14 49	4 59,3
Preston Steeple - - -	51 17 55	1 12 54	4 51,6
Shottenden Windmill - - -	51 15 41	0 55 25	3 41,7
Harbledown Steeple - - -	51 16 58	1 3 13	4 12,9
Sturry Steeple - - -	51 17 55	1 7 5	4 28,3
West-Stone-street Windmill - - -	51 10 22	1 1 45	4 7
Stelling Windmill - - -	51 10 51	1 3 6	4 12,4
Ashford Steeple - - -	51 8 56	0 52 18	3 29,2
Brook Steeple - - -	51 9 38	0 57 8	3 48,5
Willsborough Steeple - - -	51 8 14	0 53 52	3 35,5
Kingsnorth Steeple - - -	51 7 3	0 51 49	3 27,3
Shadoxhurst Steeple - - -	51 6 14	0 48 53	3 15,5
Kennington Steeple - - -	51 10 12	0 53 17	3 33,2
Great Chart Steeple - - -	51 8 33	0 49 39	3 18,6
Westwell Steeple - - -	51 11 39	0 50 39	3 22,6
Pluckley Steeple - - -	51 10 30	0 45 14	3 0,9
Eastwell Steeple - - -	51 11 23	0 52 24	3 29,6
Charing Steeple - - -	51 12 37	0 47 44	3 10,9
Allington, or Aldington Steeple - -	51 5 16	0 57 36	3 50,4
Lymne Steeple - - -	51 4 20	1 1 22	4 5,5
Mersham Steeple - - -	51 7 1	0 55 47	3 43,1
Monks Horton Steeple - - -	51 7 30	1 1 53	4 7,5

Latitudes and Longitudes of Objects intersected in 1796.

Names of objects.	Latitude.	Longitude east from Greenwich.	
		In degrees.	In time.
	° ' "	° ' "	m. s.
Linton Steeple	51 13 24	0 30 40	2 2,7
Sutton Windmill	51 12 46	0 36 9	2 24,6
Chart Sutton Steeple	51 12 56	0 34 54	2 19,6
Lenham Steeple	51 14 13	0 43 6	2 52,4
Romden Stables	51 8 49	0 42 36	2 50,4
Smarden Steeple	51 8 57	0 41 8	2 44,5
Bethersden Steeple	51 7 45	0 45 10	3 0,7
Rolvenden Steeple	51 3 3	0 37 50	2 31,3
Beckley Steeple	50 59 1	0 37 24	2 29,6
Bidenden Steeple	51 7 3	0 38 23	2 33,5
Headcorn Windmill	51 10 21	0 36 41	2 26,7
Ulcomb Steeple	51 13 1	0 38 31	2 33
Staplehurst Steeple	51 9 30	0 33 9	2 12,6
Cranbrook Steeple	51 5 50	0 32 10	2 8,7
Egerton Steeple	51 11 44	0 43 43	2 54,9
Frittenden Steeple	51 8 20	0 35 24	2 21,6
Snargate Steeple	51 1 23	0 50 10	3 20,7
Snave Steeple	51 2 1	0 52 12	3 28,8
Warehorn Steeple	51 3 27	0 50 13	3 20,9
Orleston Steeple	51 4 36	0 51 10	3 24,7
Winchelsea Steeple	50 55 26	0 43 34	2 54,3
Sandhurst Steeple	51 1 3	0 33 4	2 12,3
Whittersham Steeple	51 0 39	0 42 10	2 48,7
New Church Steeple	51 2 42	0 55 38	3 42,5
Ivy Church Steeple	51 0 45	0 53 18	3 33,2
St. Mary's Steeple	51 0 29	0 53 11	3 32,7
East Guilford Steeple	50 57 50	0 45 21	3 1,4
Appledore Steeple	51 1 47	0 47 22	3 9,5
Old Romney Steeple	50 59 25	0 53 50	3 35,3
New Romney Steeple	50 59 7	0 56 22	3 45,5
Playden Steeple	50 57 46	0 43 56	2 55,7
Brookland Steeple	50 59 51	0 49 58	3 19,9
Iden Steeple	50 58 50	0 43 43	2 54,9
Brede Steeple	50 56 7	0 35 49	2 23,3
Benenden Steeple	51 3 54	0 33 41	2 14,8
Brasses Windmill	50 57 46	0 32 3	2 8,2
Icklesham Steeple	50 55 1	0 40 29	2 42
Boughton Malherb Steeple	51 12 51	0 41 34	2 46,3
Peasemarsch Steeple	50 57 54	0 41 7	2 44,5
Woodchurch Steeple	51 4 51	0 46 12	3 4,8
High Halden Steeple	51 6 11	0 42 52	2 51,5

CONCLUSION.

THE account contained in the foregoing pages is presented in its present form, agreeable to the resolution expressed in our last communication. It is there stated, or rather implied, that, as materials are collected, details will meet the public eye through the medium of the Philosophical Transactions. The publishing of these particulars at periods not very remote from each other, will prove convenient, as we shall be enabled to communicate many *data*, which would be necessarily withheld, were these disclosures less frequent. It is on this account, that the particulars in *Part the First* do not contain the latitudes and longitudes of the stations, and objects intersected, as sufficient *data* have not yet been obtained for making the computations in an unexceptionable manner: but the contents of the *Second Part* are more complete, that Survey having been carried on in a country sufficiently near the meridian of Greenwich to give the necessary arguments with precision.

It is perhaps scarcely necessary to observe, that the design intended to be answered by an admission of the plans of the triangles annexed to this account, is to enable the reader to comprehend with ease the state of the operation, and to apply, without difficulty, the materials found in the body of the work to future Surveys. We have therefore, not attempted to delineate any varieties of ground in the plan of the western triangles (Tab. XI.): and it may, in this place, be proper to mention,

that the ranges of hills expressed in the plan found in our last account, were copied from authorities of the late Major General Roy. The map now given, of the operations performed in Kent (Tab. XII.), has the ground depicted in as accurate a manner as the scale will admit of, Mr. GARDNER, from the minuteness of this Survey, being enabled to do it with accuracy.

On adverting to a principal object of this undertaking, that of preparing materials for correcting the geography of the country, it may be expected something should be said, respecting the accuracy of the maps of those counties in which our operations have been carried on. It is almost unnecessary to observe, that great correctness cannot result from the methods commonly taken in large surveys, which are usually made with an apparatus altogether unfit for measuring angles or bases with a sufficient degree of accuracy: and it will evidently appear, on applying the distances given in this, and our former paper, to those maps, that they are, generally, very defective. We must, however, observe, that LINLEY'S and CROSSLEY'S Map of Surry, and GARDNER'S Map of Sussex, are the best which have yet fallen under our notice: the first is, in some measure, indebted for its excellence to the Trigonometrical Operation in 1787; and the latter to our own; as the distances between many stations, and the situations of many churches, in the southern, and western parts of Sussex, were given to Mr. GARDNER prior to the publication of our last account. The geography of Devonshire and Dorsetshire is found particularly erroneous, as may be easily discovered by an application of our distances to the best maps of those counties.

N. B. In Tab. XI. the triangles connecting the three principal objects in the Scilly Isles, and the stations from whence they were intersected, are laid down in that detached position to shorten the plan.

Errata in the former Account.

Page 57, line 4, for 124 read 125.

95, line 18, for 258 read 285.

115, in the table, for 51° and 60° read 50° and 66° .

ib. ib. col. 4, for 30 read 33.

142, against Southwick Church, for 57710 read 5771.

146 *et alibi*, for Mitford read Milford.

147 *et alibi*, for Funtingdon read Fordington.

168, line 10 from bottom, for $39''$ read $47''$.

172, lines 2 and 3, for $\frac{1}{13}$ read $\frac{1}{15}$.

The triangles numbered 84, 100, 105, are doubtful, and consequently the results depending on them are uncertain.

•• Take 412 from the pages referring to the Philosophical Transactions for 1795, and you have the corresponding pages in the former Account.

1703

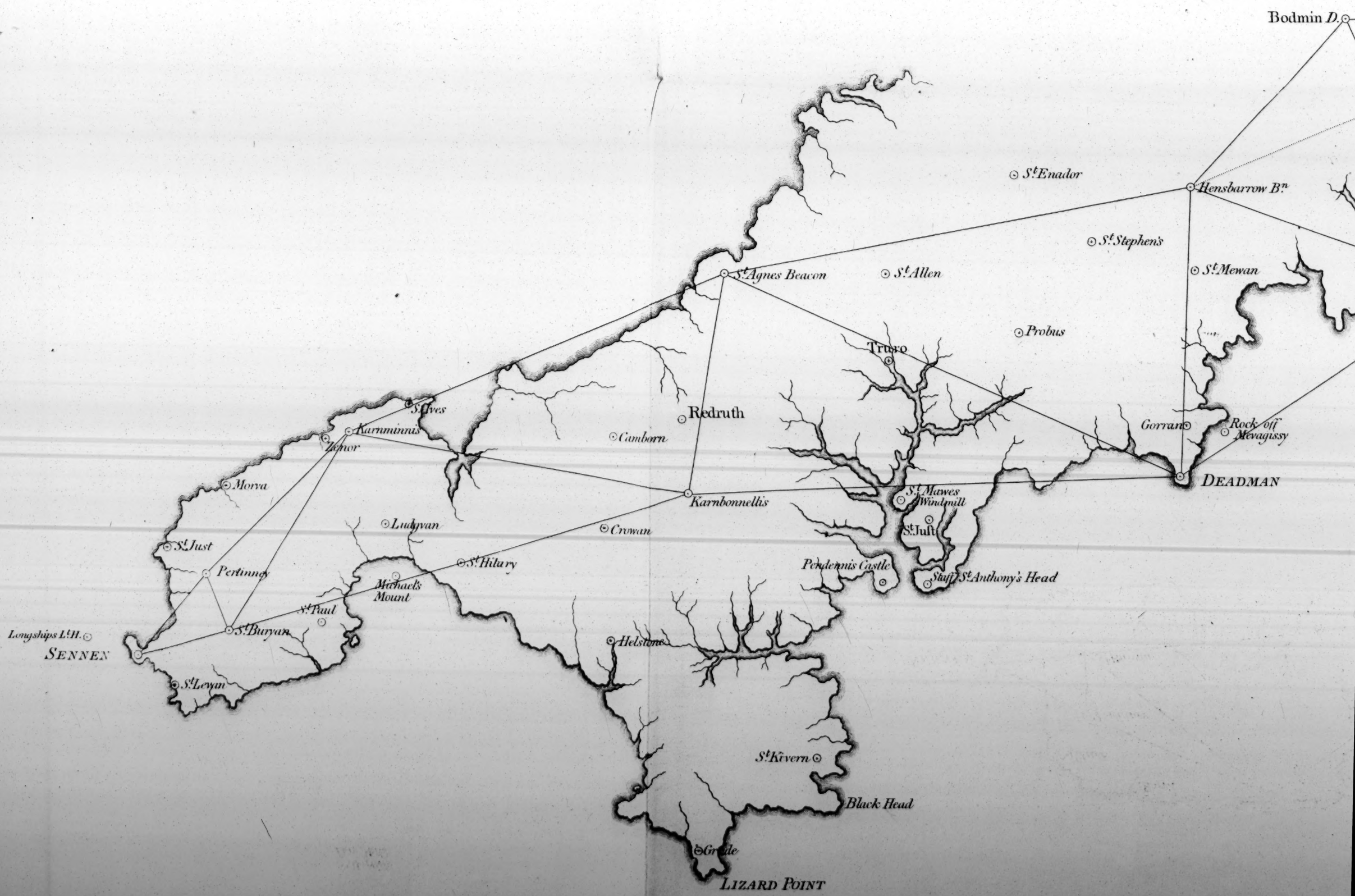
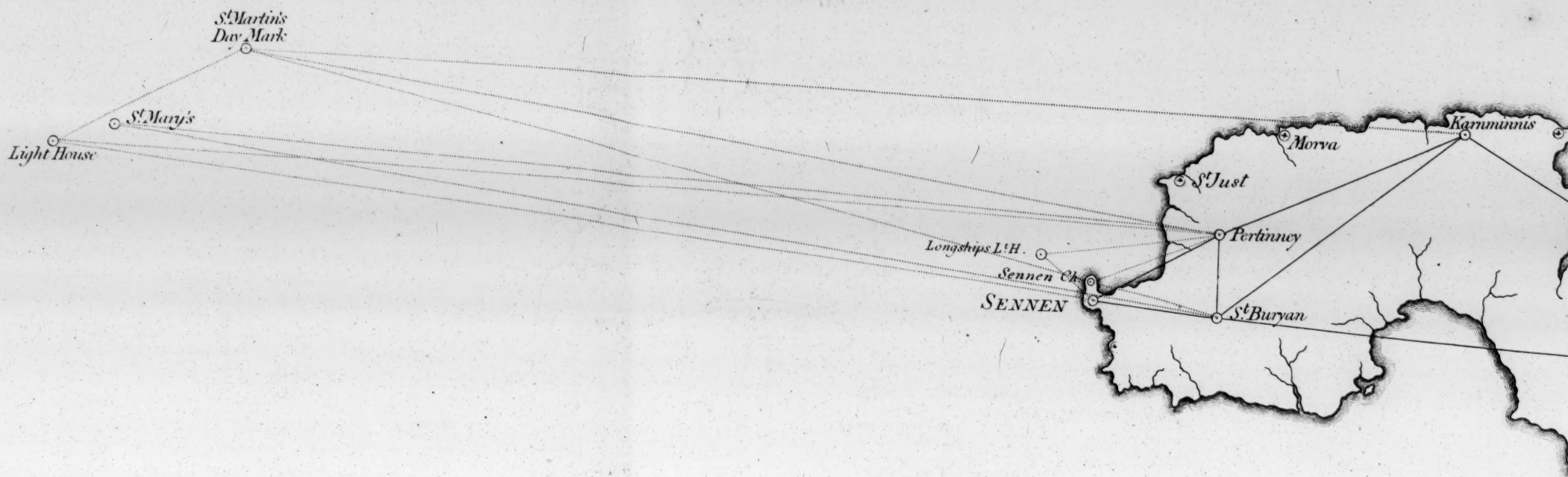
111

It is the duty of the State to protect the rights of its citizens and to maintain the peace and order of the community. The State is responsible for the welfare of its people and for the preservation of its resources.

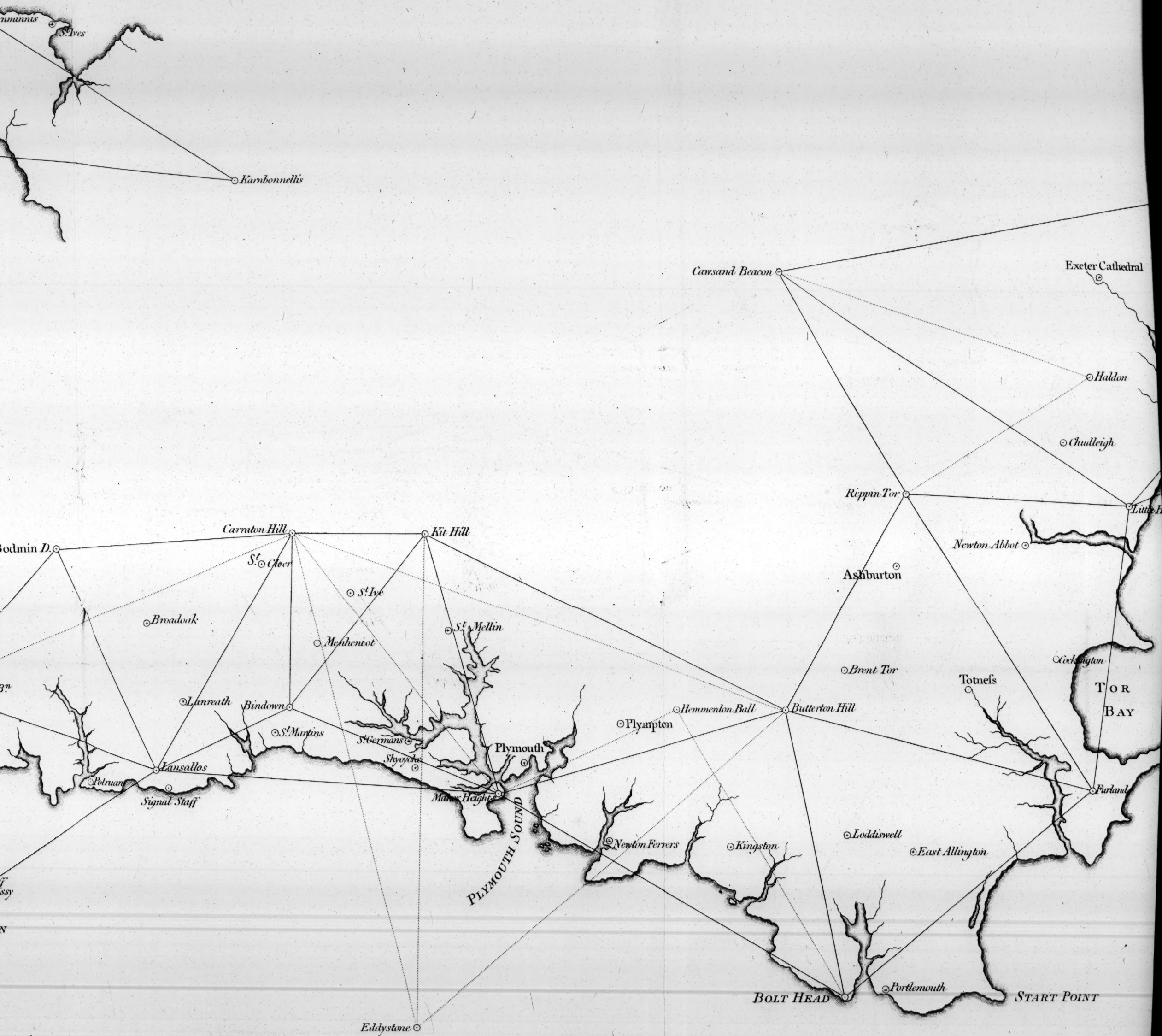
Chapter I. The State and the Citizen

The State is the organization of power which is responsible for the maintenance of order and the protection of the rights of its citizens. It is the duty of the State to provide for the common good and to ensure that the rights of its citizens are not violated. The State is also responsible for the education of its citizens and for the promotion of the welfare of the community.

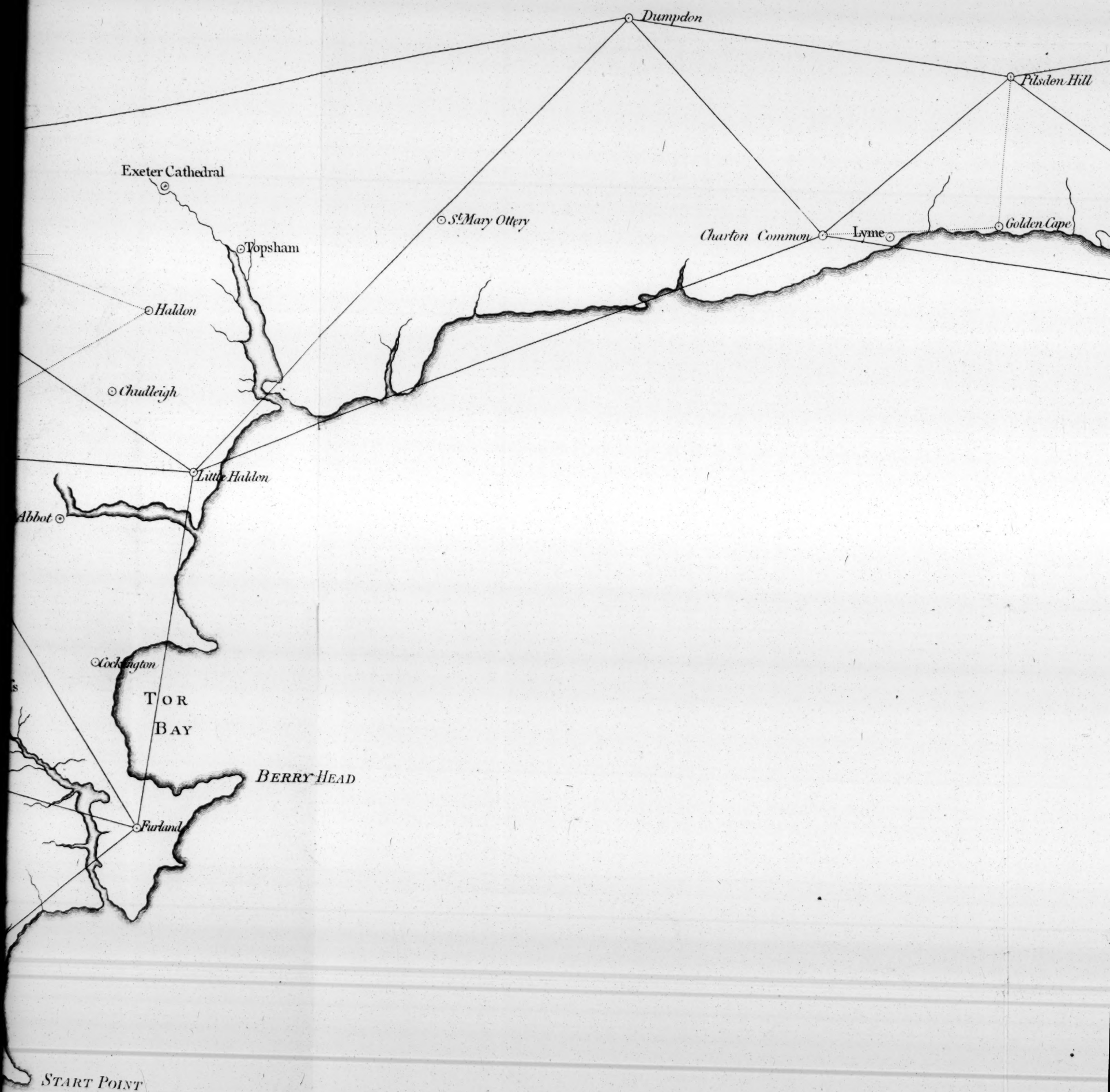
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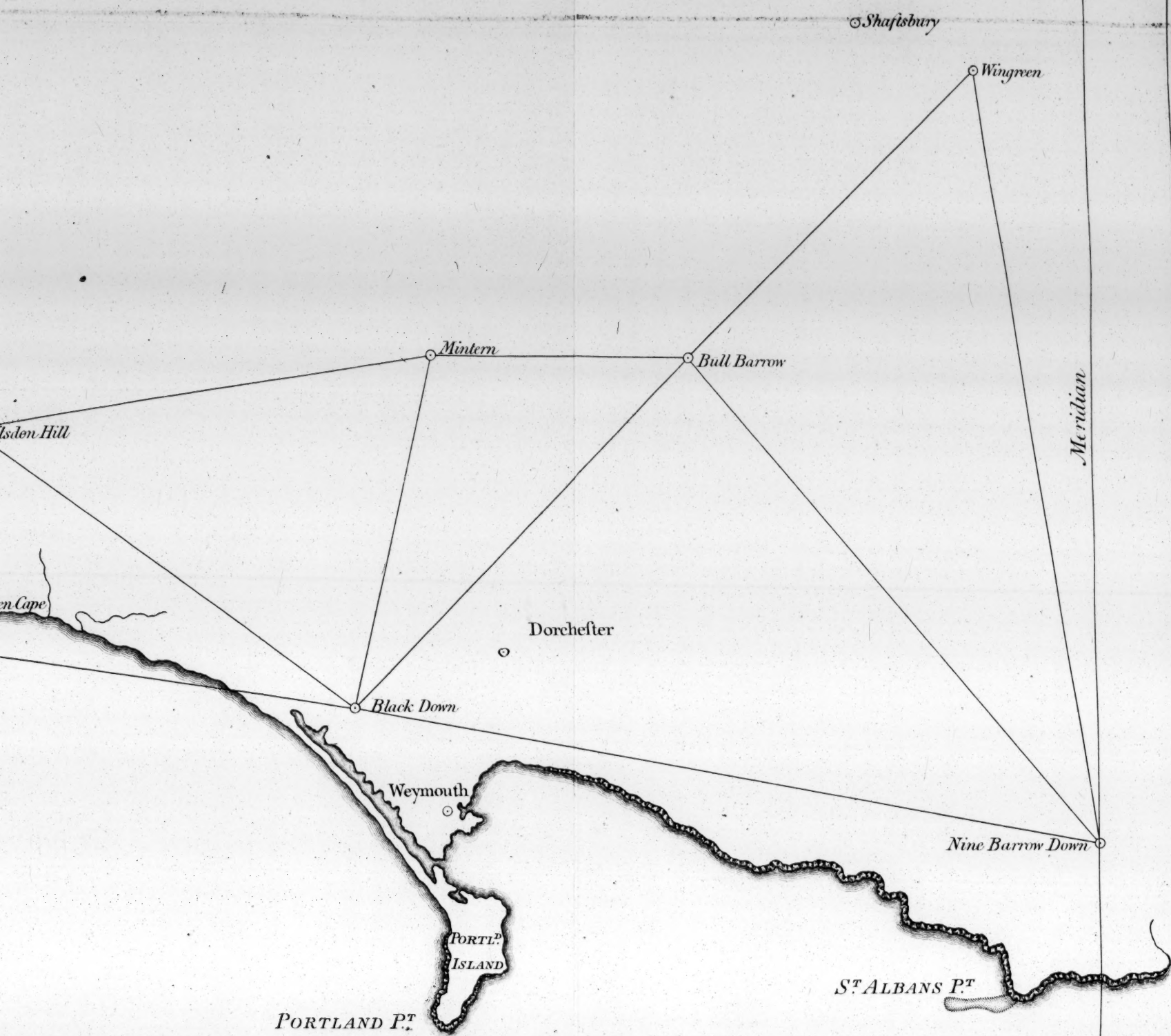
A PLAN of the *PRINCIPAL TRIANGLES* in the TRIGONOMETRICAL SURVEYING.



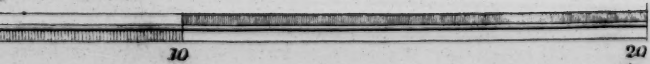
TRICAL SURVEY, 1795-1796.

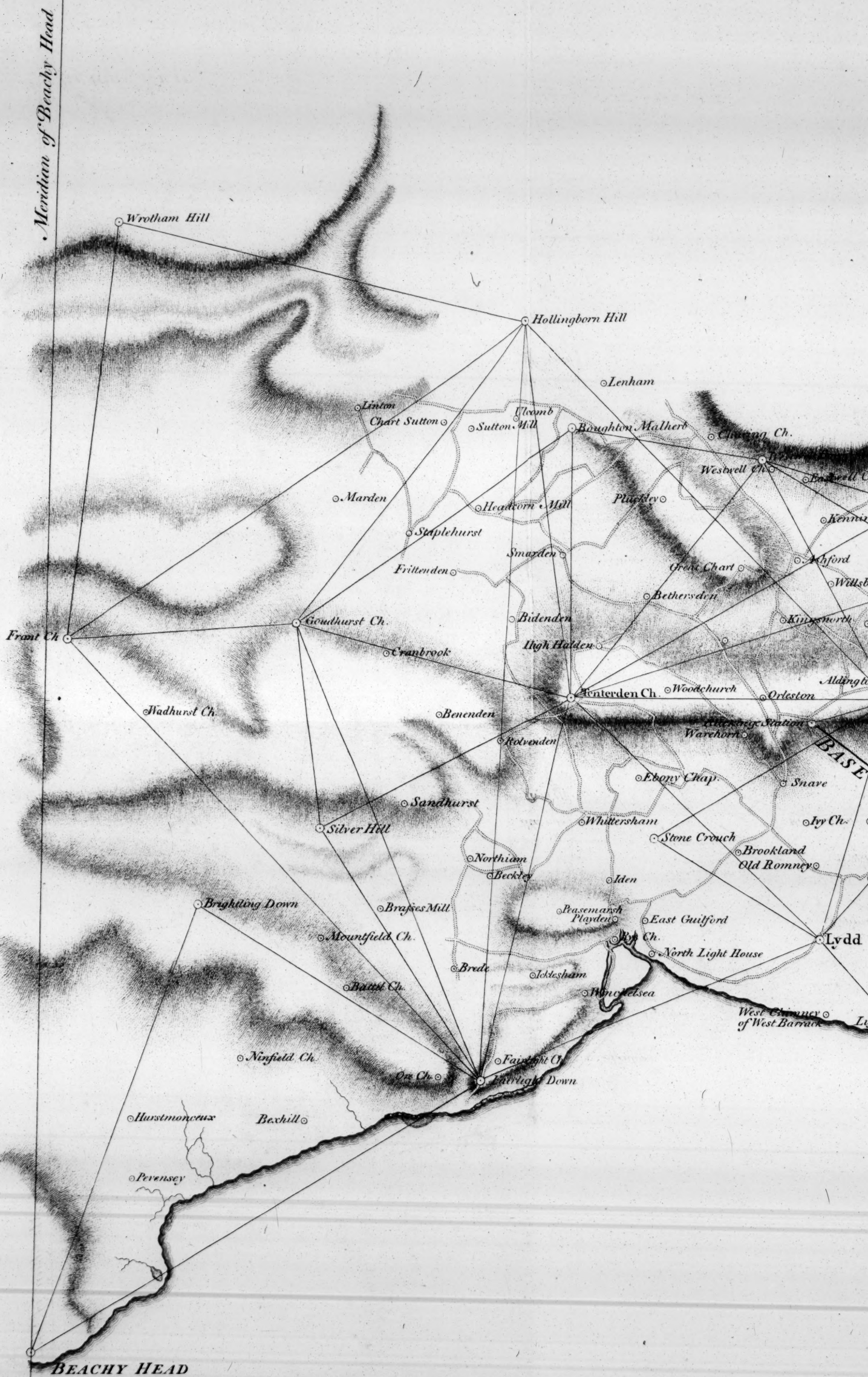


Scale of Thirty English Miles

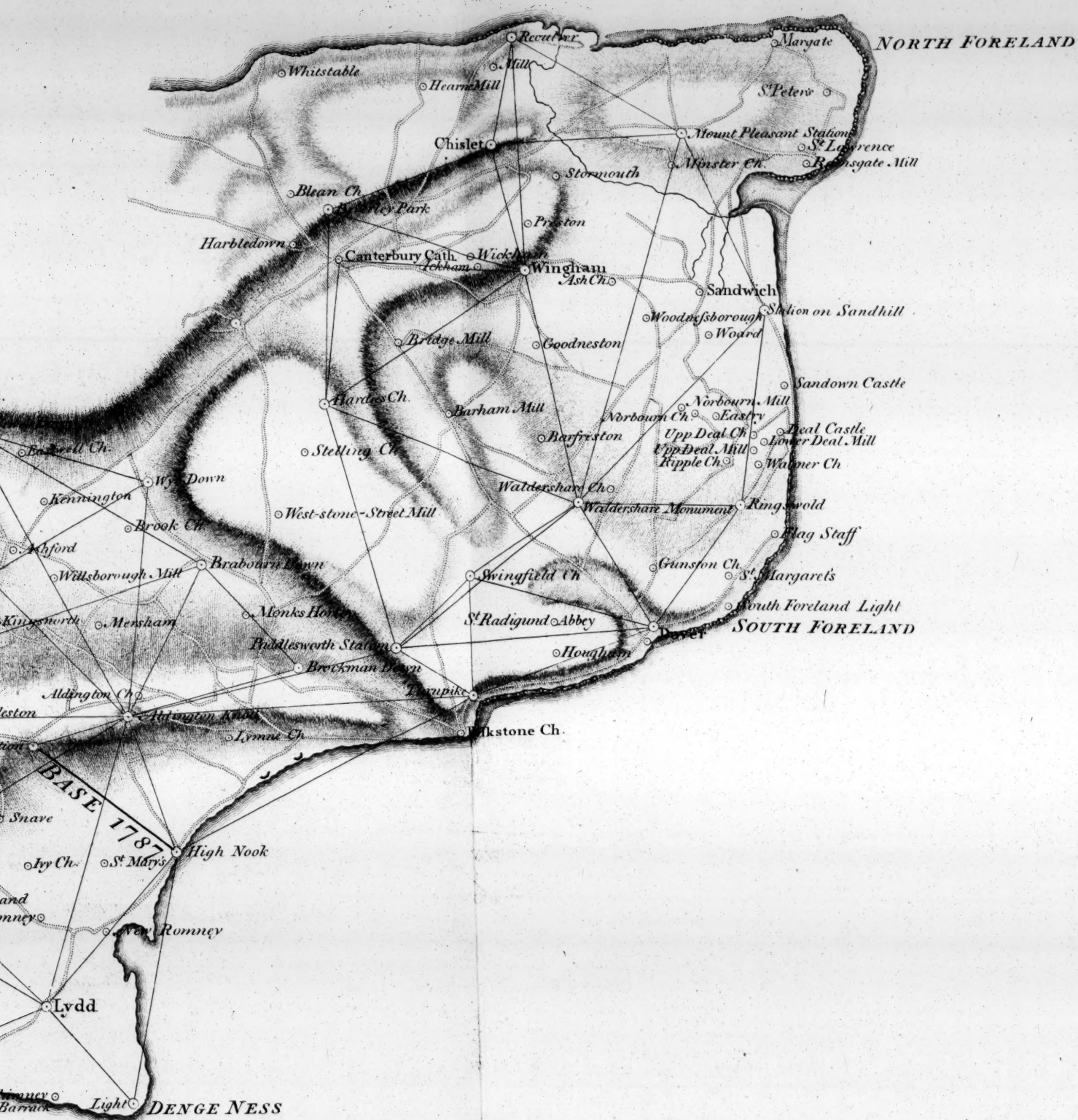


English Miles





Scale of Two



Scale of Twenty English Miles